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May 2023

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For farmers
and contractors

THE PROFESSIONAL FARM MACHINERY MAGAZINE

€500K ELECTRIC FENDT

TRACTOR TEST

Fendt 1167 Vario MT

Challenging test for twin tracks

- Three contractors rate self-propelled tankers
- Increasing nitrogen value of slurry
- Veenhuis Rotomax in Scotland
- Used Joskin tanker buying tips

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REPORT: Nurse tank efficiency

Looking at ways to boost output

TEST: Vogelsang UniSpread

10.5m trailing shoe struts its stuff

REPORT: Improving soil health

Making the most of on-farm compost

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EDITORIAL

TRACTOR TESTS · PROFESSIONAL · INDEPENDENT · UNIQUE
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€500K ELECTRIC FENDT

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REPORT: Nurse tank efficiency – Looking at ways to boost output

TEST: Vogelsang UniSpread – 10.5m trailing shoe struts its stuff

REPORT: Improving soil health – Making the most of on-farm compost

If this was a 'scratch 'n' sniff' magazine, there'd be a definite waft of slurry and digestate in the air. Why? Because we've several articles for you on making the most of organic fertiliser and soil conditioners. So, take a deep breath in ... and enjoy.

Mervyn Bailey
Editor

Dear Reader

Needing some inspiration on what to write here, I decided a break away from the screen would do me good. Open the back door, and ... Wow! The distinctive and, for many, pleasantly sweet aroma of slurry filled my nostrils – all part and parcel of living in the countryside. It's pretty apt, too, because, if you hadn't guessed from the front cover, there's a definite muck, slurry and digestate slant to this issue as I try to book off several focused topics in each magazine. Well, that's the aim.

Not so long ago we didn't have many tests, driving impressions and other features in our online Test Centre database on machines used for dealing with the smelly stuff. But that's now changed, not only because farmers are utilising slurry and muck more wisely to help grow crops, reduce bought-in fertiliser costs and improve soil health, but legislation is also playing its part in dictating matters.

Some form of applicator for slurry application is pretty much a prerequisite in many regions of the UK and Ireland. So, we've tested the Vogelsang trailing shoe and spoken to Jamie Taylor from Cheshire contractor N D Harper about how he scores the shoe against the dribble bar system his firm also operates. And for those fed up of dealing with macerators, Swiss company Brunner has developed a new applicator that relies on pressure and a bit of centrifugal force.

Also in this mag, Turriff-based Gask Farm has been making use of digestate for crop nutrition since it commissioned its AD plant in 2006, but it has evolved the way the liquid is applied. I had a chat with Gask's Andrew Rennie about his experiences with the Veenhuis Rotomax and learned, for example, how cereal crops grown with digestate develop a waxy layer on the straw. This can create its own particular challenges at harvest time.

However, it's not all slurry and digestate. You can also see how passionate Michael Leyland is about soil health, something we should all be striving to improve. Though some may view it as an unnecessary expense, Michael explains the merits of turning farmyard manure into compost to enhance nutrient take-up ... just one of the many benefits this product brings to the mixed Northumberland operation.

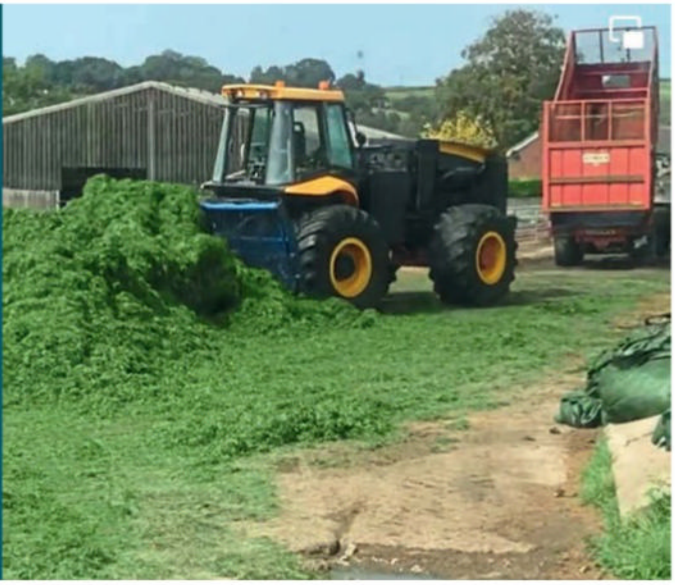
Until next time, happy farming.

Mervyn Bailey, editor, *profi international*

You can get in touch with me via mervyn.bailey@kelsey.co.uk or turn over to page 98 for further details.

WHO DID IT?

This interesting-looking machine recently popped up on a short Facebook video. Do you know anything about it? We'd like to learn a little bit more.



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ZERO-EMISSION

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Agromec electric Fendt

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How do newcomers to the four-wheel self-propelled sector, like Vervaet and Oxbo, stack up against established players such as Vredo? Three contracting enterprises give us their opinion on why they've plumped for four-wheelers.

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The recent investment in a nurse tank has allowed McConaghy Contracts to keep its tankers moving and its umbilical system working to capacity on outlying blocks of ground.

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Rather than relying on a powered macerator/distributor, the Swiss-built Schleppfix has a fan-shaped plate to feed the trailing shoes. We find out how it works.

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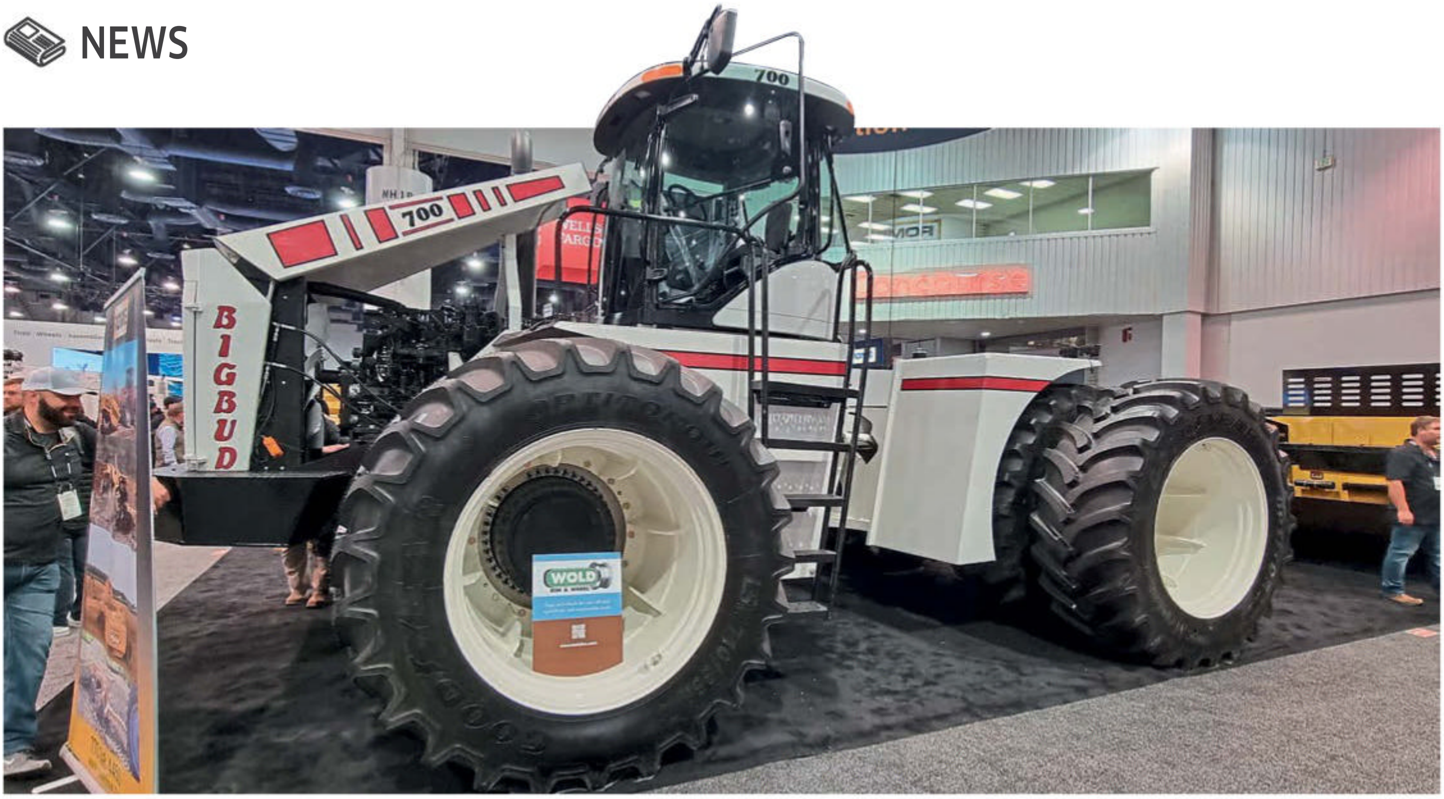
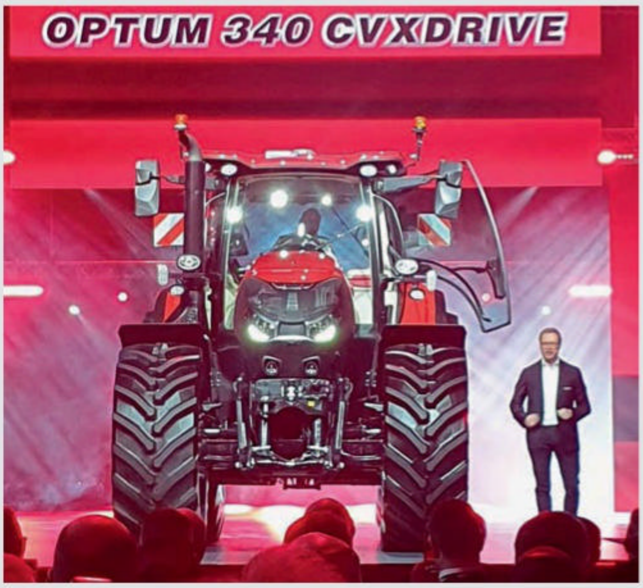


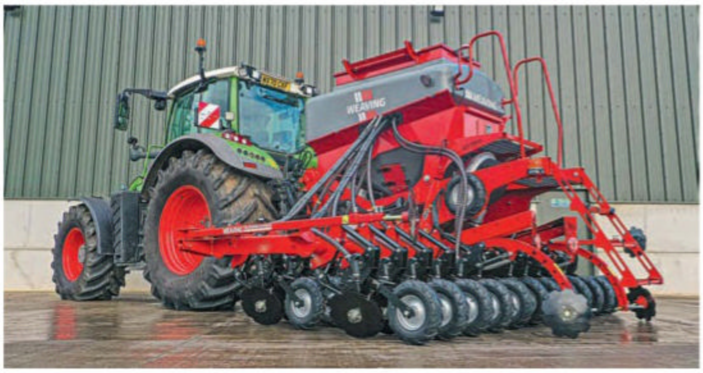
700HP BIG BUD

The first new Big Bud tractor in more than 40 years was previewed at the ConExpo construction trade show. Developed jointly by North American companies Big Equipment and Rome Agricultural and Construction Equipment, the 700hp C18 engine, 18-speed powershift and rear axles were supplied by Cat. It will change on the production model, but the cab on the prototype is from a Challenger MT900. The tie up with Rome and the ConExpo launch suggests that the construction sector is the primary focus. However, it is also likely to appeal to large North American farms pulling wide seed cart drills. The two partners hope to make six tractors during the first year and gradually ramp up the numbers. It is possible that a rubber tracked option could come in the future, but a smaller 400hp to 500hp wheeled model is likely to be first. *Picture: Daniel Foged.*

MORE OPTUM POWER

There are no details, but this grainy picture, which was sent to us along with a similar New Holland image, suggests that Case IH and New Holland are preparing to add a new 340hp flagship to the respective Optum CVXDrive and T7 HD PLM ranges. Unveiled to dealers in Madrid, the rest of us will probably have to wait until Agritechnica to see the new models. The 6.7t block in the two ranges currently peaks at 311hp.





COMPACT DRILL

Weaving Machinery says that the new easier to use and maintain 3.0m and 4.0m mounted GD disc drills will appeal to small farmers and those who prefer compact mounted machines.

New features include a tubular coulter frame which helps to keep it clean, and a two-section folding mechanism for easy calibration and hopper emptying. Resulting in better weight distribution and through-flow of material, the 2,000l plastic tank comes from the Sabre drill. Heavy duty steel lids and a side door offer good access for maintenance and cleaning, and rear folding steps and two-stage platform provide plenty of space for filling the hopper.

A gas spring in the upgraded GD coulter system is said to be more reliable than the previous hydraulic cylinders and results in easier set up. Seed distribution is powered by RDS Artemis Lite controls with electric metering, while a 6" hydraulic fan delivers seed to the coulters.

RANGER ON ROLLOUT

Looking to extract maximum launch bang per buck, Ford is staggering the introduction of its all-new Ranger pick-up. First come Raptor and Wildtrak, which are already starting to appear in UK dealerships. Then in May we should see XL, XLT and Platinum. And last to arrive will be Tremor and Wildtrak X, scheduled for first deliveries in July.

The phased introduction of the seven-model Ranger line may be less than ideal, but, with the new VW Amarok also rolling out of the Ford factory in South Africa at the same time, it was almost inevitable. Too many new variants all at once for optimum production set-up, reckons Ford. Hence the phasing.

Not that there's likely to be any shortage in demand. Ford says the overall European pick-up market has returned to its pre-Covid upward trajectory, which had seen the annual total hit 180,000 vehicles in 2018 before slumping to 110,000 in 2022. Such is the rate of recovery that the firm predicts we'll be back to 180,000 units by 2025 ... at the latest.

So, which of Ford's magnificent seven is most likely to appeal to farmers? Probably not the pictured Raptor flagship, with its £56,000+ tag and 652kg payload, the latter making VAT non-reclaimable. Of much broader appeal will be the Wildtrak (2.0-litre four-cyl diesel or 3.0-litre V6 diesel), Wildtrak X (2.0-litre diesel only and Bilstein suspension) and Platinum (V6 diesel only), all of which get 1.0t payloads, 3.5t towing and are VAT reclaimable. Nett prices are from £39,350 (Wildtrak) and £44,400 (Platinum), with the Wildtrak X tag still to be announced. We'll be driving the 'X' in an upcoming issue.

ELECTRIC SKID STEER

The S7X is Bobcat's first all-electric skid steer. Like the T7X all-electric compact track loader released in 2022, the S7X, which is still a prototype, is powered by a 60.5-kWh, lithium-ion battery. The torque generated by the electrical powertrain is said to be up to three times greater than a traditional machine. Capable for operating for up to eight hours on a single charge (depends on the application), a full charge takes around 10 hours.

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IN BRIEF .....

LARGEST CONTINENTAL TRACTOR TYRE

With a diameter of 2.14m, the VF TractorMaster 900/60 R42 weighs 450kg, has a load capacity of 10.3t, and is the largest Continental tractor tyre so far. Developed specifically for 300hp+ tractors, the new size joins the five VF TractorMaster sizes released last year; 650/60 R34; 650/65 R42; 710/75 R42; 650/65 R34 and 710/60 R34.

RECORD YEAR FOR LEMKEN

Lemken sales increased by 25% last year to a record figure of around €559 million. New cultivators and ploughs helped drive additional demand, and another major contribution to the company's success was the acquisition of South African precision seed drill manufacturer Equalizer. Exports currently account for 80% of Lemken sales.

MORE DELAVAL MILK ROBOTS

Encouraged by increased sales of its automatic VMS milking systems, DeLaval has decided to build a new facility to make more of them. Still in the planning stage, but expected to be up and running in 2024, the new facility at Tumba (Sweden) will increase production capacity by 50%.

AGRIROUTER COMPATIBILITY

Kverneland's IsoMatch FarmCentre fleet management and wireless telematics solution allows operators to now use their IsoMatch Tellus Pro and Tellus Go+ universal terminals as a gateway to link Kverneland Group implements to cloud-based services. This enables real-time data exchange for sending and receiving tasks. Other new features include a dedicated dashboard that corresponds to the implement and the task controller for simplified in-field performance. FarmCentre now has the ability to communicate with the Agrirouter universal data exchange platform.

SCOTTISH EXPANSION

Merlo UK has appointed Kelty-based J Low Agri Services as a new dealer and expanded the territory and responsibility for existing dealer Ross Agri Services. This follows a decision by Merlo UK to end its relationship with HRN. Ross Agri Services, a Merlo dealer since 2020, is setting up a new division (RAS Plant Sales) to operate alongside Ross Agri Services from its existing St Cyrus, Turriff depots plus the newly acquired Muir of Ord location.

BETTER THAN EXPECTED YEAR FOR LELY

Lely turnover increased by 15% last year to €702 million (2021: €611 million). The company reckons it is a good result considering the challenges of the pandemic, the discontinuation of operations in Russia and component shortages. The company expects to further increase sales this year, although the uncertain components situation is resulting in longer delivery times for new products.

CNH TO SELL GIANT LOADERS

Tobroco-Giant compact wheel loaders will soon be available with Case and New Holland branding in North America. The result of an agreement between CNH Industrial and the Dutch manufacturer, the new models, which initially cover operating weights from 1.0t to 5.0t, are expected to be available through the two companies construction dealer networks in the second half of this year.

RETURN OF THE LANDPOWER

The Landini Landpower has returned to the European price lists in the form of two Stage V models: the 160 (155hp-165hp) and 180 (166hp-175hp).

The iconic range disappeared from Europe in 2014, but Argo Tractors continues to make Stage III Landpower II models (117hp-157hp) at the Italian plant in Fabbrico for non-emission markets. Slotting in between the current four-pot 6RS (up to 155hp) and 7 series SWB (7-165 and 7-175) ranges, the Stage V Landpowers share their front end and 6.7l FPT six-pot 24-valve block with the latter. This is mated to the same T-Tronic powershift currently offered on Stage III Landpower tractors. Aimed at customers with no need for the firm's Robo-Six (six-speed powershift) or VShift (CVT), the simpler six gear/three range box provides 54f x 18r speeds, and a top speed of 40km/hr.

Mounted on silent blocks (air suspended seat option), the cab is also from the Landpower II. Updates over the Stage III models include the larger 280l fuel tank (+38l AdBlue) and the wheelbase has been stretched from 2.73m to 2.88m.

Lift capacity of the electronically controlled Cat II/III rear linkage is 8.4t (external controls on the rear fenders). The tyres are 540/65R28 (front) and 650/65R38 (rear), and the maximum permissible gross weight of the 6.7t tractors is 11.3t.

GRASS SILAGE APP

Pöttinger's Harvest Assist app provides the grass silage team with an overview of the fields to be harvested, and current status (mowed, tedded, raked, or collected). As soon as a task is finished, the tractor or self-propelled machine operator changes the field status.

This alerts the operator of the following machine and in the live location mode the position of each one is displayed on a map in real time. Available for iOS and Android, it is said to be easy to add fields to the app and assign them to individual machines, and the free to install app has an integrated navigation system.

The algorithm that calculates the optimum harvest sequence is worth mentioning. Grass silage volumes, the distance between each field and the farm and the compaction performance on the clamp are superimposed on the display. In theory this provides trailer or wagon drivers with information needed to deliver crop to the clamp at regular intervals to avoid peaks.

SPRAYBIB FLOTATION TYRE

Designed for self-propelled sprayers, the VF710/60 R46 is the first very low-pressure flotation tyre in the Michelin SprayBib CFO range.

Like the rest of the 2022-launched SprayBib CFO (Cyclical Field Operation) range, the winder tread pattern and casing design on the new 2.05m-diameter VF710/60 R46 allows axle loads to be increased and in-field inflation pressures to be lowered. The optimised footprint is claimed to provide up to a fifth more traction.

Already available at Michelin dealers, the SprayBib CFO VF 710/60 R46 is also available as an OEM fitting on AGCO, CNH, and John Deere machines.

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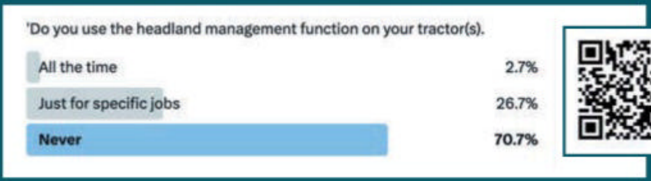
Profi Twitter poll

The results are in! This month we asked: 'Do you use the headland management function on your tractor(s)?' and the resounding answer to that seems to be 'no' with a massive 70.7% of our readers giving that answer. Followed by 26.7% saying 'Just for specific jobs' and just 2.7% saying 'All the time'.

This month we're asking: 'Thinking about wearing metal on ploughs, cultivators and drills, do you fit…'



'Do you use the headland management function on your tractor(s).

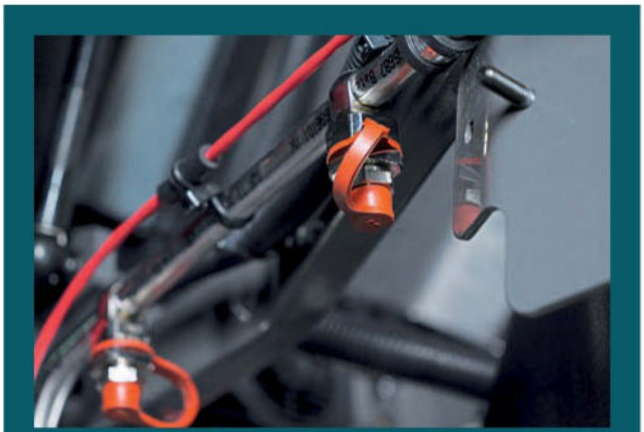
All the time	2.7%
Just for specific jobs	26.7%
Never	70.7%

- Standard steel wearing parts
- Specially hardened / faced parts
- Composite wearing parts

Keep an eye on the profi Twitter account @profitractors for the upcoming poll (plus all profi updates) or simply scan the QR code. We look forward to hearing from you.

MORE DEWULF

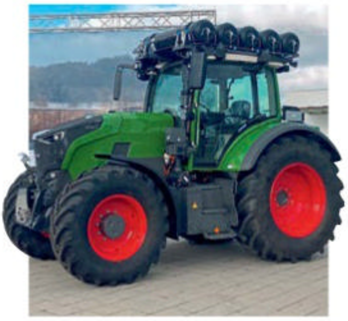
AgVantage UK has taken over the Dewulf distribution and support activities formerly provided in Yorkshire and North Lincolnshire by Beverley-based Yorkshire & Humber Machinery.
AgVantage will continue to operate from a local base in Yorkshire holding a parts stock and operating a local service team. This will be backed up closely by the larger stock and team at the Peterborough headquarters.
"Operating from two locations gives us a much wider coverage across the UK," comments AgVantage managing director Andy Carse. "Also, each depot will have access to a larger parts stock, meaning more availability and faster reaction times to better serve our customers."
All existing agreements customers may have with the Yorkshire & Humber business will be honoured. Russell Button, the new depot manager for AgVantage for the Yorkshire and North Lincolnshire area, is one of the founders of Yorkshire & Humber Machinery.



AUTO FIRE EXTINGUISHER

A fire under the hood of a tractor spreads quickly and is difficult to put out with a handheld extinguisher. Valtra reckons to have a solution in the form of an automatic fire suppression system.
Claimed as fast, compact, and efficient, it comprises an agent tank linked to a network of hoses and nozzles located under the bonnet and cab.
Fitted at the Unlimited Studio at the Suolahti factory in Finland, and available for the N5, T5 and Q5 ranges, all the operator has to do to release the extinguishing agent is press several buttons on the in-cab control box. It is also possible to operate the system remotely.

HYDROGEN TRACTOR



Fendt has developed the prototype of a hydrogen-powered tractor. The only information that the company is prepared to disclose at this stage is that two first-generation prototypes will soon be delivered to German farms.

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IN BRIEF .....

MORE DELAVAL FOR TH WHITE

Already responsible for DeLaval across the southwest, TH White is now expanding eastwards, gaining new territory that stretches from Wales to the Norfolk coast. The move follows the decision by Norfolk dairy business Taylor IMS to close. T H White is investing in the Attleborough based operation and developing it to further support dairy farmers on the eastern side of the UK. The additional facility will supplement the current dairy depots in Frome, Somerset and Huntley, Gloucestershire.

RECORD YEAR FOR GERMAN MANUFACTURERS

Sales of German produced tractor and farm machinery exceeded €12 billion for the first time last year. According to the VDMA (Agricultural Machinery Industry Association), lost orders from Russia and Ukraine were more than compensated for overall, and positive the farm earnings situation triggered strong buying in North and South America and key west European markets.

CNH ACQUIRES AUGMENTA

CNH Industrial, which secured a minority stake in Augmenta in March 2021, has bought the rest of the precision farming solution business for around US$110m. The company will operate within CNH Industrial's Raven brand as part of the company's precision farming technology. It will maintain its existing employees and offices North America and its R&D facility in Athens, Greece.

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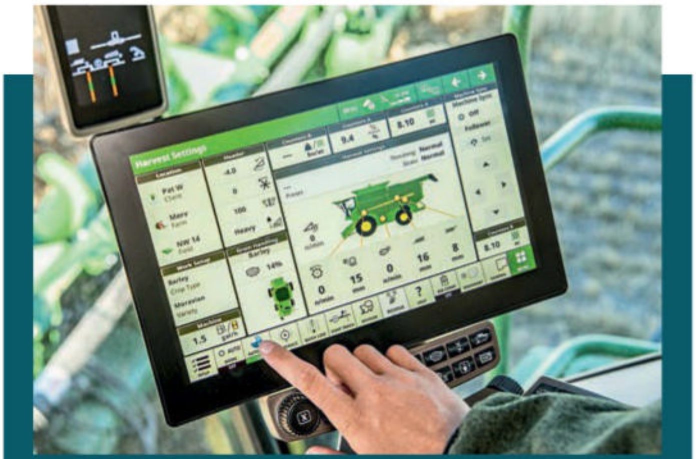
NEW OWNER

Italian self-propelled sprayer manufacturer Grim has been bought by Milan-based investment fund Hyle Capital Partners.

Based in Jesi, Grim manufactures sprayers with tank capacities from 3,500l to 5,000l and boom widths up to 36m. Distributed in Australia, Chile, Europe, North America and Japan, the UK debut was at Cereals last year, following a distribution agreement with Scottish Borders dealer Merse Agriculture. The plan is to increase sales in existing overseas markets and leverage the Guaresi dealer network to enter new ones.

Grim is the fourth investment for Hyle, which aims to create an Italian agricultural group with a turnover of €50 million within the next five years. The company also has a stake in dried fruit company Manuzzi and sparkling wine producer Contri Spumanti. Last year it acquired Italian self-proplled tomato harvester manufacturer Guaresi.



FASTER PRECISION

The full HD resolution John Deere G5 display comes with additional memory and increased processing power. The two portable versions (10.1” G5 and 12.8” G5Plus) can be used on all brands. Plus, there are two integrated monitors for specific John Deere machines and an extended monitor option.

Offering up to a third more space for maps and information compared to the predecessors, both ISObus compatible displays, which use the familiar G4 user interface, come with IP65 water resistance. The G5 Plus comes standard with AutoTrac and section control.

The new license program for advanced features means users only pay for what they need, and upfront costs are reduced. Both displays will be available for order later this year, and the G5/G5Plus CommandCenter will be available on John Deere machines from model year 2024.

ALTERNATIVE FUELS

Kubota (UK) has approved use of the paraffinic fuels hydrotreated vegetable oil (HVO) and gas to liquid (GTL) in all its diesel engines. Both comply with the European standard EN15940 and the change can be made without any modification.

The company says that there is no requirement to flush fuel tanks or change filters, as both fuels are safe to mix with diesel. Nor are there changes to existing maintenance intervals or warranty conditions, although operators may notice a slight degradation in engine performance from using the lower density paraffinic fuels, compared to diesel.

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VERVAET TELEMATICS

New Vervaet self-propelled sugar beet harvesters and slurry applicators imported by J Riley Beet Harvesters (UK) are already equipped as standard with Connect telematics. Now the Dutch manufacturer has introduced a system for older machines. Suitable for adding to the Beet Eater 617, 625 and Q-616 manufactured from 2011 onwards, and Hydro Trikes made from 2016 to 2019, application maps can be created for slurry spreading, whilst additional optional equipment makes yield mapping possible on sugar beet harvesters. Fitment requires additional wiring and a new touchscreen control terminal.

There are two license levels – Essential and Premium. The basic level provides real-time machine tracking and remote access to operational data, service information and warnings. Premium allows field-specific data to be exported to farm management software including retrieval of historic data to allow customer- and field-specific reports to be generated.

VERVAET
HydroTrike

FASTER CLEANING

New features on the latest RoGator 645, 655 and 665 include the redesigned plumbing system, where a separate clean water pump allows the new ContiRinse system to reduce the downtime spent cleaning and rinsing the plumbing system after spraying,

Other updates include the Altek electro-pneumatic nozzle bodies. Replacing the fully electric Arag versions, the new ones are compatible with the OptiNozzle automatic nozzle selection system.

Boom stability has been improved with six OptiSonic height sensors – previously four – to keep the booms automatically adjusted in uneven crops. The central sensor has been repositioned away from the rear axle to keep it clean.

New in-cab options include a fridge. There is an improved handsfree system with a centrally located gooseneck microphone, and stronger mirror mounts reduce vibrations on rough terrain.

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300HP LANDINI TRACTOR

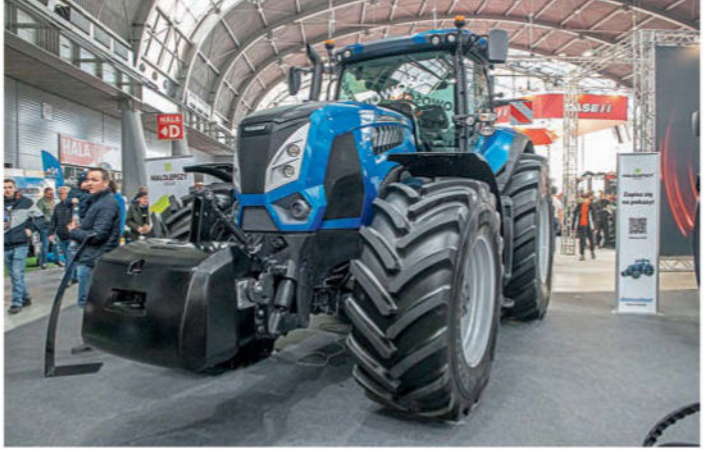
The recent Polish Agrotech farm machinery show was the world premiere for Landini's first 300hp tractor. Called the 8 series, the two models: the 8-270 (273hp) and 8-310 (313hp), are both fitted with a V-Shift CVT.

Landini dealers and customers have requested a tractor with more power than the 7-230 for some time. Landini and McCormick owner Argo Tractors is keeping much of the spec under wraps, but the Fabbrico plant has confirmed that the 8s are powered by the same 6.7l six-cylinder Stage V FPT block as the McCormick X8.

This is equipped with an electronically controlled turbocharger eVGT and SCR exhaust aftertreatment system. The V-Shift CVT, which reaches 40km/hr at a quiet running engine speed of 1,300rpm (optional 50km/hr at 1,600rpm), also comes from the McCormick flagship.

Inside the four-pillar cab, the operator's seat has a dynamic air suspension with automatic height adjustment and a backrest with heating and ventilation. The main controls and multifunction joystick are located on the right armrest. With a curb weight of around 11t (max. laden weight 14-14.5t), the wheelbase is up to 3.0m, and the cab comes with semi-active hydraulic suspension. The 8 Series can also be equipped with Landini's fleet management and remote diagnostics system.

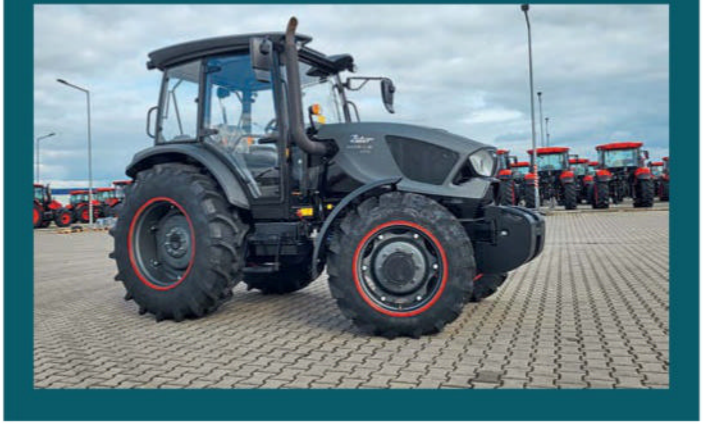
Polish show visitors were told that the new tractors will be available to order in the near future. Let's hope an 8 series tractor is on the Landini stand at Agritechnica.



Source: profitechnika.pl/Pictures: Artur Jakubek

MAJOR MAKEOVER

Other than the striking finish, we don't know much about this satin grey version of the Zetor Major CL80, which was finished just in time for the recent Polish Agrotech farm machinery show. However, we are sure that you will all agree it looks tidy in grey.



EURO TRACTOR MARKETS

The total number of new tractors sold in Europe last year (includes UK) fell by 9.6% to around 161,000 (178,000+ in 2021).

All the main markets were affected: -1.4% in France, -12% in Germany, -17% in Italy, and -16% in both Poland and Spain. The top three markets were France (34,857 units and 22% of the total), Germany (30,344/19%) and Italy (20,217/13%). The best of the rest were Poland (11,736/7.0%), the UK (11,580/7.0%) and Spain (9,318/6.0%).

John Deere topped the rankings in 17 of the 23 countries, including the main ones of France and Germany. Four of the remaining number one spots were secured by New Holland. Steyr, Zetor and Valtra continue to head the charts in their respective home markets of Austria, Czech Republic and Finland.

MANNHEIM MILESTONE

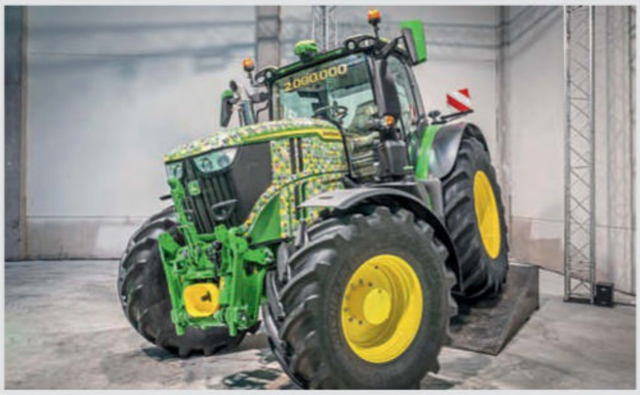
This 6250R is the two-millionth tractor to leave the assembly line at John Deere's Mannheim plant in Germany. Wrapped in portrait photos of more than 300 employees, the most powerful model currently produced at the facility will soon join the one-millionth tractor, a 6400, in the factory museum.

Some 3,300 employees help produce 40,000 tractors a year at Mannheim. The largest John Deere production facility outside North America, it is also the largest tractor production facility in Germany, as two-thirds of all tractors manufactured in the country are produced in Mannheim.

John Deere acquired the former Heinrich Lanz Ag facility in 1956. It took 70 years from the start of production of the first Lanz Bulldog tractor at the plant in 1921 to produce the one-millionth tractor in 1993, but just 30 years for the second million.

It is not only a production site, but also a development one for all medium tractors. The main focus for the 250+ engineers is on performance, comfort and efficiency, but they are also working on alternative concepts, such as the use of biofuels.

Electric drives are also being developed, albeit only for smaller tractors. The company says that battery capacity for larger machines is not yet sufficient. Looking ahead, John Deere plans to present the first fully autonomous and battery-driven tractor (approx. 100hp) in 2026.



EXPANSION AT VÄDERSTAD

The Swedish manufacturer has announced plans to further expand the Väderstad facility to increase production capacity. The goal is to produce 10,000 machines a year by 2028.

The company has seen a strong increase in demand for its products during the last five years, which is reflected in the steady rise in turnover from €237m in 2017 to €550m in 2022.

To keep pace with demand, the company set to work to erect a new production building in 2021.

Expected to be ready for use later this year, the latest investment will see two 6,300m^2 extensions connected to the existing factory. Resulting in a total production area of approx. 70,000m^2,the new buildings will provide additional assembly and painting space.

Henrik Gilstring, CEO of Väderstad Group, says that the continued expansion of the plant is in line with the company's growth targets. "It will benefit both our customers and our dealers as well as create a more efficient flow in our production," he says.

The two new buildings are planned to be in full use by autumn 2024. The Väderstad plant currently produces machines for all global sales regions, except for North America.

BIG BUCKS

Articulated John Deere classics from the 1980s continue to command high prices in North America, but this 8850 takes some beating. The 1988-built 6,226-hour tractor recently changed hands for an eye-watering US$111,000.

Sold by Hamilton-based (Illinois) Sullivan Auctioneers, the tractor is believed to be the last re-powered by Kinze in 2013. Nowadays, the North American manufacturer is best known for its chaser bins, planters and cultivators, but from 1988 to 2007 it re-powered over 600 John Deere 86-series tractors. Numerous 8630s, 8640s and 8650s were converted, but the majority were 8850's where the V8 was swapped for a 360hp Cummins 855 engine. The recently-sold 8850 was re-powered much later than the rest.

Incidentally, this is not the highest price paid for a Kinze re-powered John Deere 8850. A 1982-built (2,550-hour) tractor recently sold for US$114,500.

WEED ZAPPER

Warwickshire-based manufacturer RootWave has developed an electrical weed control (eWeeding) system for orchards, vineyards and fruit, and is eyeing row crops for the future.

In independent trials in orchards last year, the company's patented high frequency eWeeding system delivered full control of weeds. Successful trials have also been carried out on maize and sugar beet.

The RootWave machine treats weeds using electrodes mounted on purpose-designed hydraulic arms to work between different row widths of crops. Electricity creates heat within the weed and its roots, 'boiling' them from the inside out.

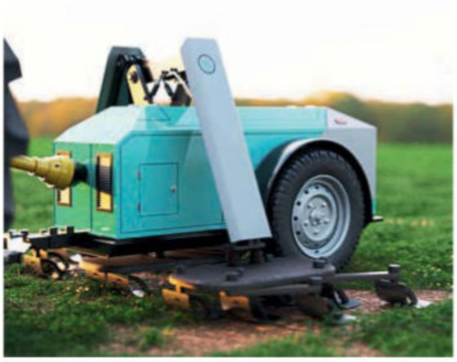
In 2018 the company launched the RootWave Pro hand-held eWeeder and has sold more than 150 units in the UK and Europe for use in municipal and environmental applications.

RootWave's trials have demonstrated that eWeeding provides full control of weeds at a lower total energy use than chemical herbicides.

Mr Diprose said: "RootWave delivers the most effective, economical, environmentally friendly and safe weed control on the market.

"Because the plant and roots are killed by heat generated within the weed itself, the number of applications needed in a season is comparable to that of herbicides and less than required for mechanical weeding."

The machine is powered by the PTO on a standard tractor. Commercial prototypes will be working at demonstration days this summer, and orders for the orchard version are being taken now for 2024 delivery. A system for row crops is expected to be available in 2025.



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Fendt 1167 Vario MT:

Efficient lugger

Fendt is currently the only manufacturer to offer a stepless-transmission tracked tractor in the 600hp plus category. So, what does this mean for drawbar power, fuel consumption and comfort? We find out.

Way back in 2017, Fendt released its first stepless-box tracked tractors with the three-model 900 Vario MT, topped by the 317kW/431hp 943MT. Fast forward on to 2021, and it was the turn of the four higher horsepower tracked units (376kW/511hp to 495kW/673hp max outputs) to get the Vario treatment. But it wasn't just the transmission that saw a fundamental change, as there was also a change in engine: rather than AGCO Power's own 12-cylinder, 16.8-litre motor, Fendt opted for a six-cylinder MAN with the low-revving concept (1,730rpm), which we've seen rolled out across many of the firm's bigger wheeled tractor models.

While the 1151, 1156 and 1162 have the D3876 engine with a 15.2-litre displacement, the top tractor, the 1167 Vario MT with a rated output of 439kW/588hp is equipped with the mighty MAN D4276, which has a bore of 142mm instead of 138mm along with a larger 16.2-litre displacement.

Given these big stats we were expecting a big performance, especially as there is no restrictions on the engine output even in pto-only work.

Nebraska measurements

Usually around now we would be packing our test 1167 off to the DLG test centre in Groß-Umstadt. But since the DLG cannot accommodate a big tracked tractor on the rolling road test bed for those key Powermix measurements, we are going with the pto and drawbar power measurements from Nebraska Tractor Test Lab (NTTL) in the USA, which also carries out tests to the OECD standard.

And to keep with the American theme, it's worth noting the Fendt Vario MT tractors are still being manufactured at the former Challenger plant at Jackson, Minnesota.

Kverneland

According to the tractor maker, the 1167 has an output of 495kW/673hp at its 1,730rpm rated speed. Arguably even more important, the test engineers in Nebraska measured 446.5kW/598.7hp at the shaft ... a very good result. And since Fendt specifies the engine's maximum output as 495kW/673hp, the pto output at 1,600rpm was about the same at 451.1kW/604.9hp. With the sensationally low diesel use of 212 or 207g/kWh (+4g/kWh AdBlue), the Vario transmission more than lives up to its reputation of having very good pto efficiency.

The torque curve shows just how serious the engineers are about the low-speed concept: the MAN engine reaches its maximum torque of almost 2,850Nm at just 1,050rpm. And since the ground speed can be infinitely adjusted at any time, the torque rise of just 15.5% isn't a disadvantage, even with the heaviest draft work with abruptly changing loads.

Continuously pulling

However, the exciting question about how much drawbar power can the Vario muster remains. After all, the pto shaft on the 1167 is just one option, which, in practice, is very rarely used to obtain its full power. A track machine is bought to pull stuff, so our test

KEEPING IT BRIEF

The Vario transmission works well and, together with the MAN engine, is a very efficient combination.

In wet conditions or on slopes, the twin-track tractor can reach its operating limits sooner than an articulated machine.

FendtOne is not yet available on the MT, but it does have great suspension.

Is manufactured at Jackson, Minnesota, USA

FENDT
FENDT

With its continuously variable transmission, the 1167 Vario MT is not only pleasant to drive but also proved to be highly efficient.

tug had to show what it could do in front of the brake truck.

It should be noted that, according to Fendt, the 1167 differs from the 1162 ‘only’ by a boost of 55hp for hydraulic and pto work. However, when comparing the amount of diesel injected, there seemed to be no real restrictions on the drawbar power, with a measured test result of 382.3kW/512.6hp. A good result, just not quite as good as its competitors such as the John Deere 9620RX (409kW/548.5hp) and Case IH Quadtrac 620 (419kW/561.9hp).

More economical than a powershift

On the other hand, the Fendt excels in terms of fuel use. Here, the combination of a low engine speed and CVT seems to fit very well, with 246g/kWh making the 1167MT more economical than its four-track competitors with their powershift transmissions, which achieved 255g/kWh.

As for the gearbox, in terms of operation and handling, we don’t have to say a whole lot, especially to anyone who has operated a Vario Fendt. Even though the VarioDrive TA400T has its own housing on the tracked machine, the other main components have already proven themselves in the high-end wheeled models. The large crawler can now be accelerated steplessly up from 0.02 to 40km/hr (reverse is limited to a maximum speed of 14km/hr), can cruise control, can be programmed etc., all by using the joystick or pedal. And most seasoned track drivers probably won’t miss a shuttle on the left-hand side under the steering wheel.

Over 140kW hydraulic power

Fendt promises oil delivery at a rate of up to 440l/min when the tractor has the two independent swashplate pumps. Indeed, the NTTL measured 233.5 plus 234.4l/min from the test machine, which adds up to exactly 467.9l/min. The usable hydraulic power of 72.3kW plus 71.6kW at the rear couplers also sits well with monster-tractor billing – that’s an almost unimaginable 195hp.

There are up to eight double-acting spools on machines without a linkage; if you add lift arms the spool tally drops to six. We like the fact that the Fendt genes have prevailed in the shape of the DUDK couplers, which can be coupled under pressure and provide flow rates of up to 140l/min.

All of the tractor's Stage V exhaust emission gubbins (the DOC, DPF and SCR unit) are located in the huge stack on the right-hand side.

This same Fendt familiarity factor applies to the labelling, as well as to how you set up the tractor's time and flow rates.

The question of the MT's rear linkage is unnecessary for many users who are just after pulling power. Nevertheless, we'd like to point out the measured continuous lift capacity of 9,930daN. You can lift sizeable kit with that.

However, it's the swivelling Cat V drawbar that seems much more relevant. It not only allows a vertical load of up to 6,800kg, but the design can also swing sideways by +/-28°. This set-up greatly simplifies headland turns for the MT's twin tracks and trailed implements.

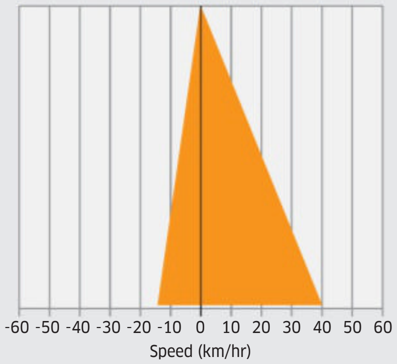
FENDT 1167 VARIO MT

SPEED RATIOS

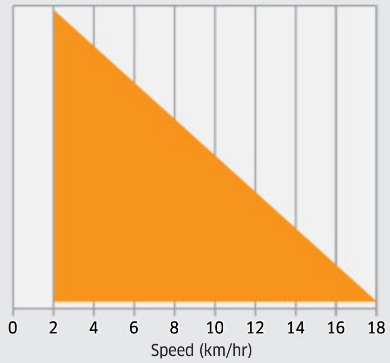
STOP
GO
END
C1
C2
MIN
MAX

Thanks to the Vario Drive TA 400T, the machine travels seamlessly from 0.02 to 40km/hr when going forward. Direction changes are carried out with the stick on the armrest.

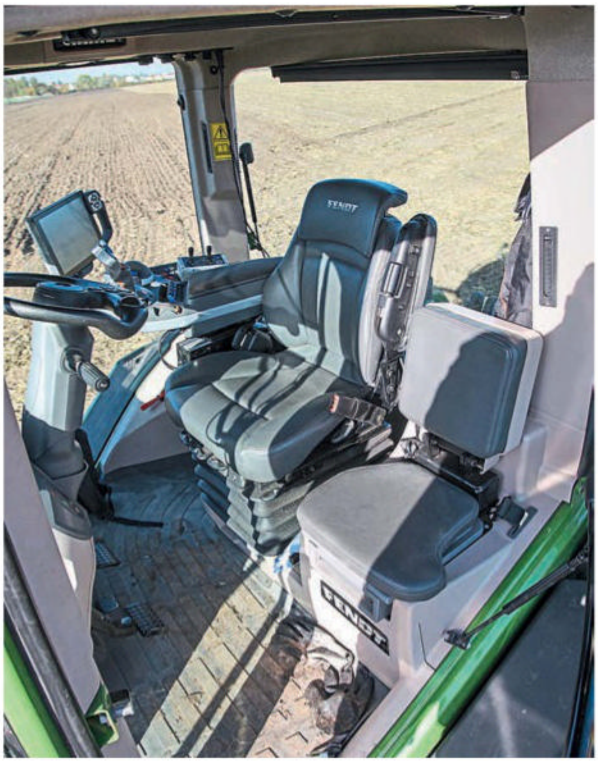
Stepless forward/reverse



Stepless from 4-12km/hr



The six-cylinder MAN engine under a similarly large bonnet is both quiet and economical. The tractor's radiator pack is completely sealed off from the engine.



The cab is nice and quiet too at 69.5dB(A), but it could do with offering extra space and being more comfortable.

Mustard Challenger drivers will be familiar with the steering wheel, which hasn't changed.

While the armrest will be familiar to Fendt drivers, the newer FendtOne controls are a long time coming.

Suspended tracks

In order to keep the 1167 within 3.0m, only the 698mm wide tracks can be fitted on a the track width of 2.29m. Alternatively, a 768mm belt can be fitted, which pushes the overall width out to 3.15m.

In addition, there are many ways to ballast the tractor, which has an unladen weight of almost 20t up to almost 27t. You just need to know where to add the ballast in order to transfer the power to the ground in the best possible way via the 3.0m long tracks.

The manufacturer's 'SmartRide+' suspension of the undercarriage with hydraulic height compensation of +/-9cm has also proved helpful. The springs not only improve the driving comfort, but, thanks to the additional cylinders, the MT can always be optimally aligned with the push of a button, depending on the towing point and ballasting. As long as the ground is right and your halfway on the level, the crawler pulls like a winch. This is what the tractor proved – at the time still in Challenger livery – when it was compared with five other high horsepower tractors with different means of putting power to the ground (*profi* 4/2017).

No FendtOne

The 1100 series cab is identical to that on the 900 Vario MT. That means there is the distinctive multifunction steering wheel, yet the armrest, including the touch screen and joystick, have been carried over from the older Fendt tractors. And, although the steps are nice and big, for such a huge tractor the

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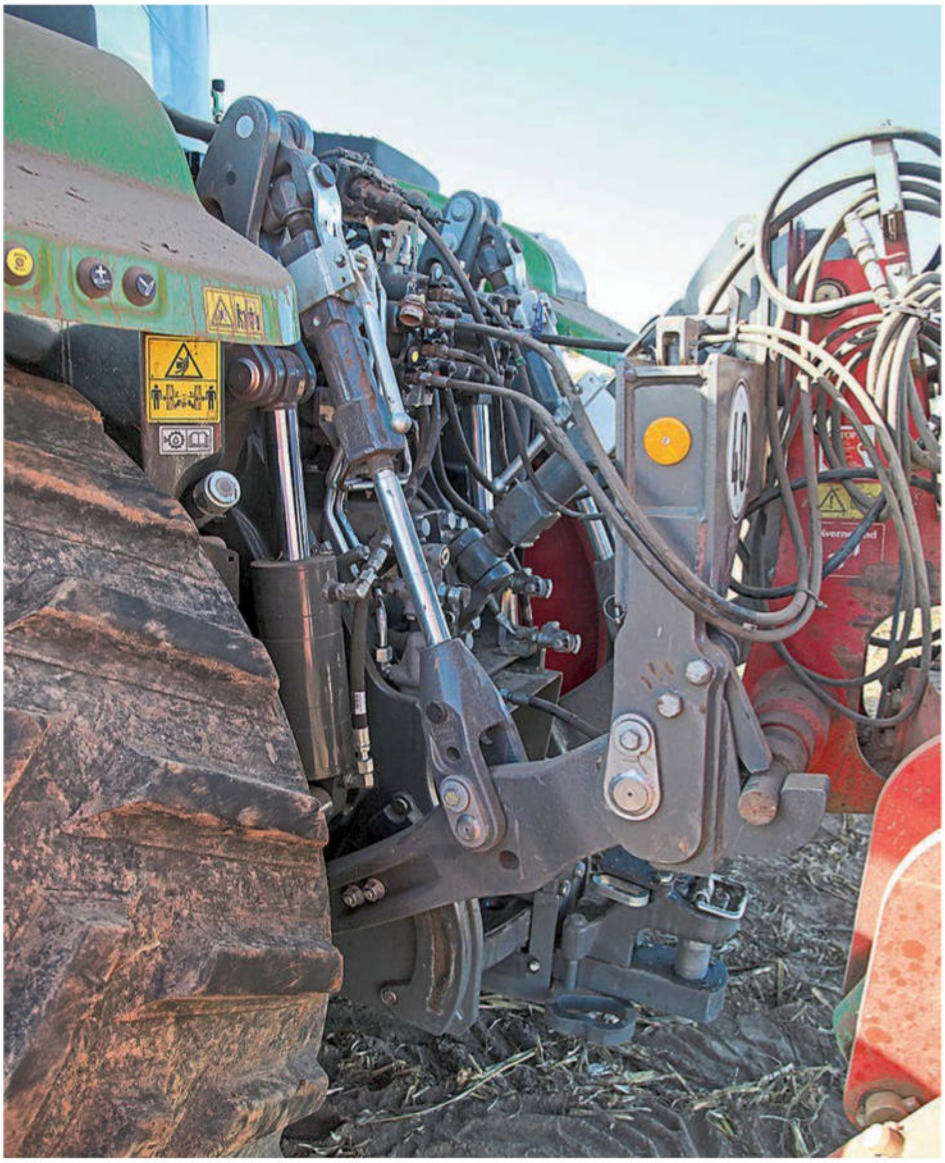
JOSKIN



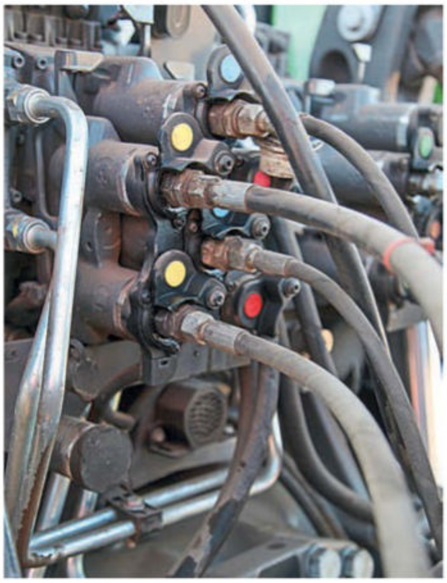
cab could really do with a bit more room. Hopefully this will get a refresh at some point and maybe even gain the FendtOne controls.

That said, the overall noise levels are pretty impressive with a low 69.5dB(A) measured by the test team. And the ride comfort is also very much OK with the optional cab suspension. The same applies to the topic of headland management, from TeachIn to the TI Headland auto turn system, with operators well catered for.

Other details

- The tracks can be pre-tensioned by the on-board hydraulic system. Depending on the operating conditions, the tracks are expected to last 3,500 (+/-500) hours, and, according to Fendt, fresh 30in rubber will cost around £29,480.
- A basic autosteer package is standard, and there is a choice of antennas from Novatel and Trimble. Optionally, there are various upgrades for the correction signal and machine control.
- In addition to the LED beacon, standard kit includes the dual circuit air brakes.

The linkage lifts almost 10t, but, like the pto, it'll be an unnecessary extra for many users. The main attraction here is the Cat V drawbar pin.



Neatly labelled connectors with relief levers – as they should be. Optionally up to eight double-acting spools and 440l/min oil flow are possible.

- As far as maintenance is concerned, oil change intervals are 500 hours for the engine and 2,000 hours for the separate transmission and hydraulic circuits.

How much?

In the basic version, the 1167 Vario MT is available in the configurator for exactly £517,299, but the list of possible additional options is long. The rear linkage (£26,206), and pto (£15,084) make a particular impact, followed by items such as the 2.0t front weight (£9,330), the RTK GPS (£4,532), the chassis suspension (£5,293) or the second hydraulic pump (£4,272) and six instead of four spools (£4,713). All in all, the price for our rather completely kitted out test tractor is £586,729.

Summary

Compared with the large, articulated tracked tractors in the league, the 1167 impresses with its understated dimensions and weight. Despite having a stepless transmission it still transmits a surprising amount of power to the drawbar, and it's efficient and comfortable to use.

Is there still demand for big tracked tractors in the UK? Not that many years ago, twin- and four-track tractors were a common tool on UK farms in our machine management articles. However, there now seems to have been a swing to tyres for models in the sub-400hp sector. Which means the big 1167 has a place, even if this place is getting smaller.

Hubert Wilmer

FURTHER DETAILS FROM OUR FIELD TEST

This is not a summary but a list of positive and less positive details.

⊕ POSITIVE

- ⊕ External cab lights for servicing
- ⊕ Comfortable passenger seat
- ⊕ Holder for diesel nozzle while you climb the steps
- ⊕ Clear sight glass caps on idler wheels

External battery terminals help if you need to jump start.

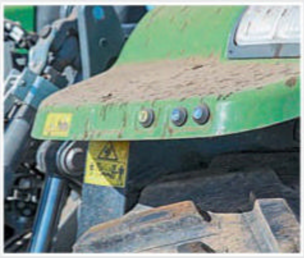
Ejector plates keep the rims free of soil and plant trash.

Sensibly positioned catwalks and handrails are top notch.

⊖ NEGATIVE

- ⊖ No indicator for the filling level, self-cleaning air filter
- ⊖ No factory-fit DAB+ radio option
- ⊖ Self-cancelling indicators are not practical

Hello old friend ... there's no sensor, just a dipstick.



There is no external spool control on the right.

Accessing the cab filters is a spanner operation.

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FENDT 1167 VARIO MT

Width: 299cm; Length: 676cm; Height: 355cm

TECHNICAL DATA

ENGINE: 455kW/618hp (acc. to ECE-R 120) nominal/max output (1,730/1,600rpm); 495kW/673hp with boost; MAN six-cylinder engine, 16.2-litre, Stage V with DOC, DPF and SCR; 1,320l diesel and 135l AdBlue

TRANSMISSION: Stepless VarioDrive TA 400T, 0.02 to 40km/hr, 14km/hr in reverse, shuttle, TMS control, cruise control

BRAKES: Wet multi-disc brakes, hydraulic actuated, auto parking brake, air system

ELECTRICS: 12V, battery 3 x 77Ah; 325amps alternator; starter 24V, 9kW/12hp

LINKAGE: Cat. IV N; ELC with lower linkage control and vibration damping (optional)

HYDRAULICS: Axial piston pump with 220l/min and 200 bar; optionally 2 x 220l/min and up to eight spools; 100l oil reserve

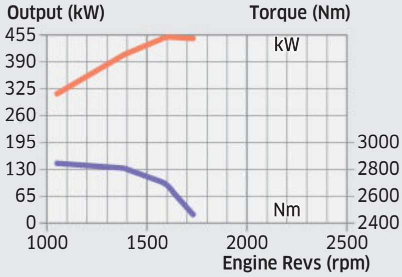
PTO: 1,000/1,000E (optional) Cat. IV flange with 55mm and 22 splines, electro-hydraulic control; front pto not available

AXLES AND RUNNING GEAR: Tracks with central beam suspension, 8° pendulum angle; 70.4cm track width (76.8cm opt., then 3.15m total width) Camso AG 5500

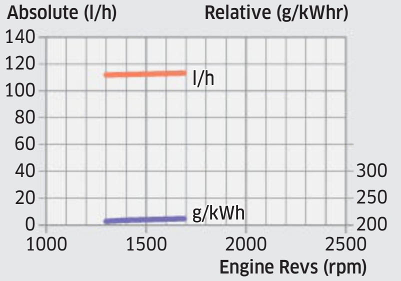
SERVICE AND MAINTENANCE: 45l engine oil (500hr change interval); 120l transmission oil (2,000hr); 125l hydraulic oil (2,000hr)

PRICES: Base specification £517,299; full specification with pto (£15,084), rear linkage (£26,206), RTK steering with TI Headland etc. (£7,247) and "Smart Ride" suspension (£5,293). Along with various other extras, this adds up to £586,729.

Output and Torque



Fuel Consumption



MEASUREMENTS FROM NTTL

PTO OUTPUT

Maximum at 1,600rpm	451.1kW
At rated speed (1,730rpm)	446.5kW

FUEL CONSUMPTION

At max power	207+17.5g/kWh
Rated speed	212+19.7g/kWh
Absolute max/rated speed	111.8/113.2l/hr

TORQUE

Max	2,846Nm (1,050rpm)
Torque rise	15.5%

TRANSMISSION

No. of gears in 4-12km/hr range	Stepless

REAR LIFT (90% max. oil pressure, corr.)

Bottom/centre/top	9,930daN
Lift height	86cm (23 to 109cm)

HHYDRAULIC OUTPUT

Operating pressure	210 bar
Max flow rate	233.5+234.4=467.9l/min with optional double pump
Output	72.3kW (228.2l/min, 190 bar) 71.6kW (224.7l/min, 191 bar)

DRAWBAR POWER

Max 382.3kW at 1,729rpm	246g/kWh
376.4 kW at 1,600rpm	243g/kWh

NOISE LEVEL (under load at the driver's ear)

Cab closed	69.5dB(A)

TURNING CIRCLE

Turns around vertical axis	6.76m (veh. length)

TEST WEIGHT

Kerb weight	19,885kg
Fully ballasted	26,762kg
(max) GVWR total weight	27,000kg
Payload	7,115kg

DIMENSIONS

Wheelbase	300cm
Track width front/rear	229cm
Ground clearance	35.9cm

*** NTTL (Nebraska Tractor Test Lab)**
OECD Tractor Test 2247
Since the tracked tractor could not be measured on the rolling testbed at the DLG Test Centre, we have to make do without a number of our customary DLG test measurements.

Fuel consumption at typical performance

APPLICATION	Output	Speed	g/kWh	l/hr
Standard pto shaft 540	100%	-	-	-
Economy speed pto 540E	100%	-	-	-
Standard speed pto 1,000	100%	1,614	207	111.8
Economy pto 1,000E	100%	-	-	-
Engine in top speed range	100%	max	251	109.6
High output	80%	90%	-	-
Transport work	80%	90%	-	-
Low output, ½ speed	40%	60%	-	-
High output, ½ speed	40%	60%	-	-

TEST ASSESSMENT

ENGINE ⊕

Performance characteristics	⊕
Fuel consumption	⊕⊕
Pto output/drawbar power	⊕/⊕⊕

Very good pto performance, good tractive power and very low consumption; good power traits with stepless transmission

TRANSMISSION ⊕⊕

Gearbox ratios/functions	⊕⊕
Shifting	⊕⊕
Clutch, throttle	⊕⊕
Pto	⊕⊕

Stepless, good engine-gearbox control, unprecedented operation with cruise control etc. in this league; right-hand shuttle only, two pto speeds with full power transmission

AXLES AND RUNNING GEAR ⊕

Steering	⊕⊕
Four-wheel drive and diff lock	*n.a.*
Hand- and footbrake	⊕
Suspension chassis/cab	⊕⊕
Weight and payload	⊕⊕

Controllable tank steering with very small turning circle, comparatively low unladen weight, but very good ballasting possibilities and high payload

LINKAGE/HYDRAULICS ⊕⊕

Lift power and lift height	⊕
Operation	⊕⊕
Hydraulic output	⊕⊕
Spool valves	⊕⊕
Hydraulic couplers	⊕⊕

Good lifting power, enormous hydraulic power; exemplary operation, spools and connectors, maximum eight spools

CAB ⊕

Space and comfort	⊕
Visibility	⊕
Heating/ventilation	⊕
Noise level	⊕⊕
Electrics	⊕
Build quality	⊕
Maintenance	⊕

Space, comfort and visibility are OK but not luxurious; noise level is OK, very good control armrest and display terminal

ABILITY	⊖⊖	⊖	◉	⊕	⊕⊕
Basic standards					●
Average standards					●
High standards				●	
Field work					●
Grassland work	●				
Transport work	●				
Loader work	n.a.				
ON-FARM PRICE	**LOW**		**HIGH**		
£424,950-£435,000					●

Grading: ⊕⊕ very good, ⊕ good ◉ average
⊖ below average, ⊖⊖ poor
Individual marks are merely excerpts from our assessments and do not necessarily result in a mathematically conclusive overall mark.

Three tractors in comparison

This is a comparison of three similar hp tractors that have been featured by *profi* in past issues

Tractor **Test report in issue**	Fendt 1167 Vario MT May 2023	Case IH Quadtrac 620 April 2017	John Deere 9620 RX April 2017
Engine Output	**455kW/618hp (rated)** **495kW/673hp (max)**	**462kW/628hp (rated)** **509kW/692hp (max)**	**456kW/620hp (rated)** **492kW/670hp (max)**
No. of cylinders/capacity	6/16.2l/V	6/12.9l/V	6/15.0l/V
Max pto output	451.1kW (1,600rpm)	402.0kW (1,900rpm)	266.9kW[1] (1,650rpm)
At rated engine speed	446.5kW (1,730rpm)	357.2kW (2,100rpm)	235.0kW[1] (2,100rpm)
Manufacturer/model	MAN/D4276	FiatPowerTrain/Cursor 13	Cummins/QSX 15
Fuel and AdBlue consumption			
Specific at max power	207+17.5g/kWh	220+23.4g/kWh	231+13.9g/kWh
Specific at rated speed	212+19.7g/kWh	233+26.0g/kWh	262+14.9g/kWh
Absolute at max power	111.8l/hr	105.5l/hr	73.4l/hr[1]
Max torque	2,846Nm (1,500rpm)	2,393Nm (1,400rpm)	1,592Nm[1] (1 550rpm)
Torque rise ...	15.5%	47.4%	48.9%
... as speed drops by	13%	33%	26%
Fuel/AdBlue tank capacity	1,320/135 litres	1,880/322 litres	1,514/83 litres
Transmission			
No. of gears	Stepless	16/2	18/9
Powershift steps	Stepless	Full powershift	Full powershift
No. of gears in 4-12km/hr range	Stepless	8	10
Rear linkage			
Lift force	9,930daN	8,780daN	9,330daN
Lift range	86.0cm	83.9cm	80.2cm
Hydraulics			
Operating pressure	210 bar	206 bar	202 bar
Max oil flow	467.9l/min	447.9l/min	442.7l/min
Max hydraulic output	143.9kW	123.0kW	125.7kW
Drawbar power			
Max	382.3kW	419.0kW	409.8kW
At fuel consumption	246+22g/kWh	255+25g/kWh	255+12g/kWh
Noise level			
Cab closed	69.5dB(A)	73.6dB(A)	72.3dB(A)
Turning circle			
	6.76m	14.70m	16.20m
Test weight **(empty/ballasted)**	19,885/26,762kg	27,361/- kg	26,192/- kg
Front axle	-	16,103kg (59%)	14,544kg (56%)
Rear axle	-	11,258kg (41%)	11,648kg (44%)
Permissible GVWR	27,000kg	32,000kg	32,000kg
Payload	7,115kg	4,639kg	5,808kg
Power-weight ratio	44kg/kW	59kg/kW	57kg/kW
List price (excl VAT) Manufacturer information	**£517,299 as at March 2023**	**£652,765 as at March 2023**	**£652,763 as at March 2023** [1] Pto output

Vogelsang UniSpread trailing shoe applicator:

A vertical alternative

With some form of low-level applicator becoming compulsory in many parts of the UK and Ireland, there's a lot of interest in retrofit solutions, especially with the grant funding to incentivise the uptake of such systems. One option is the UniSpread trailing shoe from Vogelsang; we've been testing the 10.5m version.

The demand for slurry dribble bars and trailing shoes is huge at the moment, which clearly explains why so many relatively new faces have popped up offering tanker-mounted applicators.

One of the more longstanding manufacturers is Vogelsang, and in 2020 it introduced the UniSpread as either a drop hose or a trailing shoe. Available in widths of 6.0m, 7.5m and 9.0m, these booms all fold vertically behind the tank, rather than horizontally down the sides of the barrel.

The above units were more recently joined by a 10.5m version, which has a double-fold vertical boom and first featured in profi in our 11/2022 issue, where we explained how the UniSpread was retrofit-mounted to a 10m³ Bauer BSA slurry tanker. While the vertical-folding boom is a good pairing for the tandem-axle Farmerline tank, its long barrel could also have accommodated a trailing shoe that folds down along the sides of the tank, which, in the Vogelsang range, would be the BlackBird.

KEEPING IT BRIEF

The UniSpread boom can be retrofitted to most tankers.

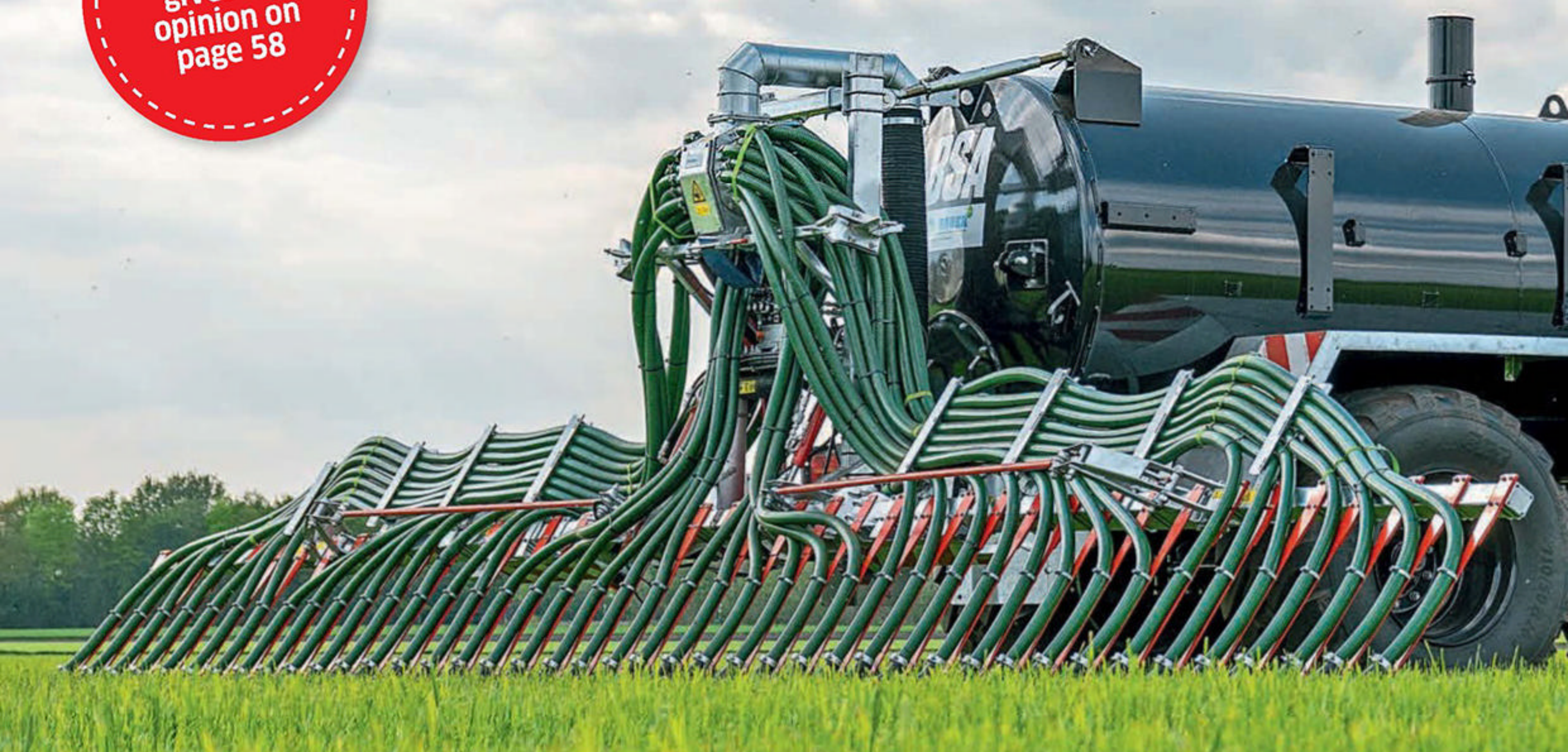
On flat fields, the application was even across the full working width.

Attaches directly to the tanker. It doesn't need a separate linkage.

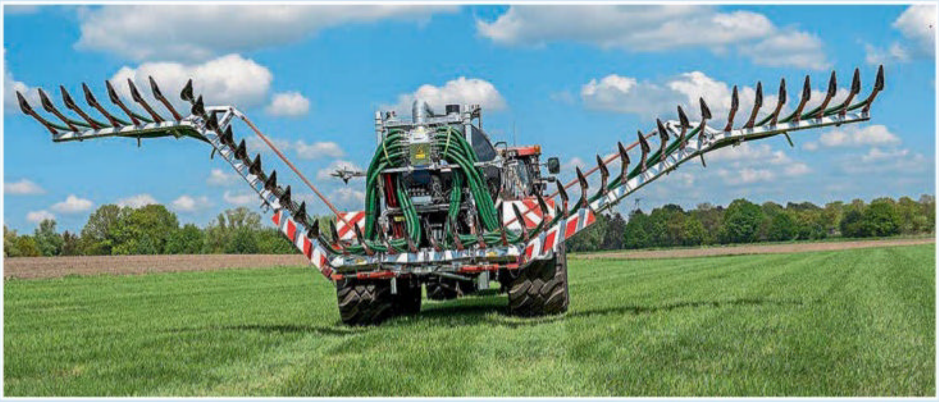
Is operated from a toggle switch control box.

Due to the current demand for slurry tankers through Europe, this Farmerline/Vogelsang outfit was the most suitable machine that we could get our hands on. It is also worth noting the price difference between the 10.5m UniSpread trailing shoe, which has a

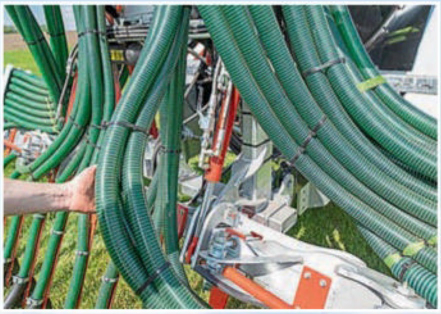
UK contractor gives his opinion on page 58



The UniSpread applicator is a good entry-level trailing shoe that can be retrofitted to single- and tandem-axle tankers.



With its double folding and integrated hydraulic locking systems, the Vogelsang boom is ready to start spreading in less than 20 seconds. In road mode the boom measures 2.55m wide and 3.35m high.



The hydraulic rams switch to float during work.

The rubber boots do the job and are identical to those on the BlackBird applicator.

base price of £23,000, and 12m Blackbird that has a tag in the region of £36,000.

Close to the back

With the UniSpread fitted, the outfit is relatively long, the applicator adding 1.35m beyond the coupling hooks. We reckon that Vogelsang could have fitted the mounting plate with the Cat III hook ends a little bit closer to the back of the tank, which would not only have reduced the tail swing from the steering rear axle tanker but benefited the weight on the drawbar. With an empty tank we measured just 280kg on the hitch; the 10.5m trailing shoe applicator weighs 1,040kg complete with feed hose.

On the road, the boom folds to a compact package behind the tank, measuring 2.55m wide and 3.35m high. When you get to the field, it takes 18 seconds for the boom to unfold. This could be made even faster by adjusting the throttle valves that control the oil flow to the rams. However, this will also increase wear.

To reduce transport height, the boom has two sections on each wing, with the outer 1.5m section controlled by a push rod. In its headland position with the shoes raised, the UniSpread has a ground clearance of 75cm – that's fine.

Rigid connection

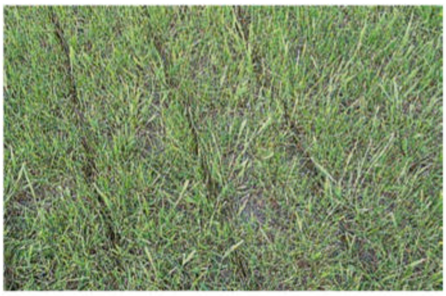
The UniSpread has a fixed mounting to the tank. Unlike on the larger Vogelsang booms such as the SwingUp unit, the central frame does not have a pendulum pivot for lateral movement. Instead, contour following is left to the red spring bars on the trailing shoes. To do this, both the rams that move the boom into the headland position and the cylinders that do the folding must be operated in their float position during work. A small LED light

TEST ASSESSMENT

VOGELSANG UNISPREAD	
Tank attachment/removal	⓪
Tank requirements	⊕
Operation	⓪
Spreading	⊕⊕
Tractor power	⊕⊕
Build quality	⓪
Road/transport changeover	⊕
Ground contour following	⓪

Grading: ⊕⊕ = very good; ⊕ = good;
⓪ = average; ⊖ = below average; ⊖⊖ = poor

BSA
Farmerline
BAUER
BOR B 4752



Here 20m³/ha of separated cattle slurry was applied to grassland. The leaves of the grass remained relatively clean.

You can still reach the hose for access to the stone/foreign object trap at the distributor without having to climb on the boom.

on the control box shows if float is selected. For particularly uneven ground, you have to accept that the applicator may lift on one side while the springs on the other side flex heavily. Vogelsang does offer an optional jockey wheel for working across this type of terrain for £1,800.

The right height

The shoes have a 25cm spacing, applying the slurry optimally when the rubber boot is parallel to the ground. To achieve this, you need to do some initial setting up (as outlined in the profi 11/2022 article). Determine the tractor's hitch height and then alter the hook ends on the tanker so they are around 72cm from the ground. This set-up process is all the more important the farther forward the axle is under the tank.

Applying thin or separated slurry on level grassland, the Vogelsang applicator behaves impeccably. The slurry is placed under the crops but not in the ground. On cultivated arable land, the shoe pressure is almost high enough for the slurry to be deposited in the soil. However, for a higher shoe pressure,

DATA SHEET

Vogelsang UniSpread

Working width	10.50m
Transport width	2.55m
Transport height	3.35m
Mounting length	1.35m
Number of shoes	42
Shoe spacing	25cm
Distributor	Vogelsang ECQ
Hose diameter	40mm
Weight	1,040kg
Base price	£23,000
As tested	£26,800

FITS AND HOLDS

The applicator is only part of this slurry spreading equation. In our test, the BSA Farmerline 100 gave no cause for concern. The 10m³ tanker had an eccentric screw (or worm) pump rated at 4.0m³/min and BPW tandem-axle running gear fitted with 710/50 R26.5 BKT tyres.

We filled the tank with the worm pump, which wasn't an issue, even when pumping from deep pits. However, the operator should stay nearby as the pump doesn't have an automatic shut-off.

Once filled, all that needs to be done is to pull the valve that directs the slurry from the tank into the pump beneath the tank. The three-way valve at the rear directs the slurry either back into the tank or to the Vogelsang macerator.

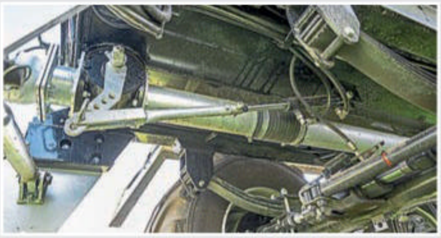
Thanks to its long build, the Farmerline from BSA is also suitable for gull-wing folding for booms of up to 15m working width.

When fully open, 25m³ of slurry flowed onto the field with the pto spinning at 400rpm and the tractor travelling at 10km/hr. Suction and output rates are well matched to the Farmerline tanker, which should be tilted forward if you wish to fully empty it.

After a long period of non-operation, the pump's stator got stuck in the housing. BSA supplies a long lever that can be pushed onto the pto stub of the pump. With enough muscle we were always able to free it off. Stones fall into the stone trap under the pump.

The Farmerline has a list price of €64,810 in test specification, but not including the UniSpread applicator.

Storage point for the pipes, sight glass, easy operation – the machine is fun to use.



The flow rate can be adjusted via the perforated plate on the three-way valve.

The steered axle makes the combination manoeuvrable. However, the boom veers out.

the headland lift cylinders then have to be pressurised.

Many operating steps

Vogelsang equipped the BSA tank with a control box, which is supplied with oil via a spool in constant pumping or by the load-sensing. While the toggle switches are easy to understand, they put a lot of onus on the operator at the headland with these multiple steps:

- Deactivate the float position
- Lift the linkage
- Stop the macerator/distributor
- Lower the boom
- Restart the distributor
- Open the valve

The above is why we would recommend the £2,500 optional control box with sequencing, which automates several steps in succession at the touch of a button.

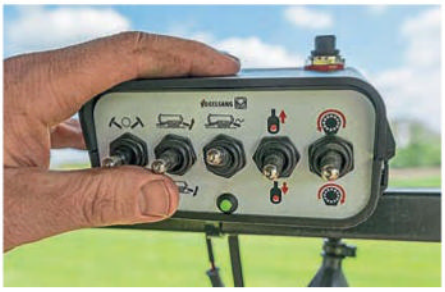
On grassland, it is difficult for the operator to see from the cab that slurry is arriving at each hose. That's why an LED indicator for the EQC distributor is also on our wish list. This would let the tanker operator know at a glance that the distributor is still turning – the macerator unit shouldn't run dry for more than 15 minutes.

Another neat solution would be a pressure gauge at the front of the tank. This would also let the tanker operator know if there is a blockage. Incidentally, the driver can change the direction of rotation from the cab. We were able to even smash up small wooden blocks, clearing several blockages in this way. Hydraulic oil requirement for the macerator is just 35l/min.

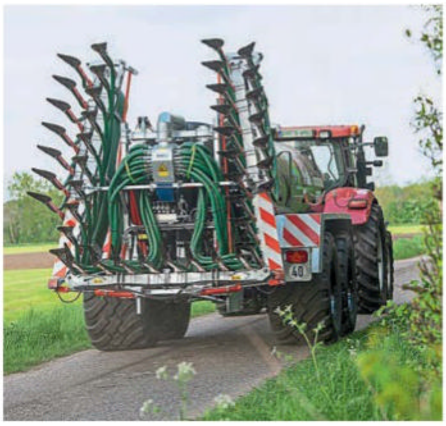
Very good distribution

When the boom is folded for transport, the shoes are raised above horizontal but not vertically. Because the distributor is higher than the shoes in the middle of the frame, any remaining liquid, especially thick cattle slurry, can leak out of the distributor and then drip out of the middle shoes. Not ideal, but almost unavoidable with the distributor mounted high on the tank.

Regarding the distributor, we obviously like the distribution across the 10.5m working width. And our feelings are confirmed by measurements carried out by the DLG, which determined a coefficient of variation of only 2.8% for cattle slurry with the ECQ distributor.



An LED to show the macerator is blocked would be a useful warning system addition to the otherwise logical control box.



The UniSpread folds to a compact package. It extends the overall length by 1.35m.

Even with a flow rate of more the 3.0m^3/min (which the BSA eccentric screw pump can easily achieve), the distribution is always uniform. The 'start-off V' is very short.

Other details

- The applicator can be easily removed and placed on parking stands. However, these stands could do with being more sturdy and robust.
- Because the shoe springs are just clamped to the boom, it would be possible to alter the spacing, but this may also require the hose routing to be changed.
- Full road lighting is part of the standard spec.
- Hose routing is neat.
- Vogelsang's vertical booms fold slightly over centre, reducing the risk of snagging tree branches.

Summary

The UniSpread is Vogelsang's entry-level trailing shoe applicator aimed at the retrofit market. To avoid taking weight off the hitch, the applicator needs to be as close coupled to the back of the tank as possible. At 10.5m wide, the rigid attachment and no central pivot mean that contour following is as good as it can be, but this is the trade-off between cost and ability. We'd certainly recommend going with the optional control box, which is capable of automated sequences.

Lastly, the cost. Recommended list price for the 10.5m Unispread trailing shoe is £23,000 (plus £2,000 fitting), while the dribble bar version is £22,000. Incidentally, the 9.0m trailing shoe version is proving the more popular model in the UK and Ireland, and this carries a price tag of £22,000.

Tobias Bensing

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LYNX ENGINEERING

Double test Weidemann 1260LP:

Simply versatile

Weidemann mid-range loaders have different loader options, the 1260LP models we consider here covering entry-level and more complete package choices.

With or without cab, fitted with a long or short boom or with or without ballast, a Weidemann 1260LP can be built to match what you want. Photos Stefan Tovornik.

The Weidemann 1260LP is a compact articulated loader, but this little machine is pretty big when it comes to the options list. Such wide choice can be a good thing but it can also make choosing the right spec a bit more demanding. To help get around this, Weidemann supplied us with two 1260LP models, one a base model the other a nearly fully specified variant.

In the midfield

For a little bit of background, the 1260LP arrived in mid-2021 to replace the 1240LP. As before, the letters after the number indicate that these are LP 'Low Position' variants with the driver sitting lower on the platform to give an overall canopy or cab height of around 2.0m, dependent upon tyres fitted. Although the new 1260LP boasts a

KEEPING IT BRIEF

Weidemann 1260LP models will suit a wide range of end user needs.

Straightforward operation, with simple controls.

Power at the wheels restricts pushing power.

revised driver platform it shares the same overall dimensions as its predecessor.

As before, the 1260LP occupies a mid-range position within the Weidemann yard loader range, and measures around 1.0m across, again dependent upon tyres fitted, with an all-up weight can be low enough to allow it to be transported on a 2.5t trailer. Although the latter targets those who may need to move the loader between sites, it is worth noting if this will allow it to be towed between farm sites in a pick-up trailer.

Engine and drivetrain

Power comes from a 1.7-litre Perkins 18.4kW/25hp Stage V compliant engine. As it is in the 25hp power class it does not need a particulate filter.

The large bonnet provides good service access.

Wheel and tyre choice will play a big role in what the machine looks like, with wider boots improving stability.

Despite having different operating weights, we found that both loaders achieved the same fuel consumption, both drinking 5.0l/hr during our unladen transport run. In mixed on-farm work, they were more frugal, consuming 3.5l/hr.

During the latter work, we became frustrated by the automatic shutdown system, this switching off the engine barely 20 seconds after the operator jumped off to either open a gate or move something out of the way. This is not quite in line with the application profile of this type of loader, users needing to get on or off frequently. We get the safety and fuel saving reasoning behind the system but feel a delay of around a minute would be more suitable.

The hydraulic pump bolts directly to the engine with drive to four individual wheel motors. The drive system is designed to ensure even power is directed to all four wheels, with the motors bolted to the chassis. There are no axles or drive shafts with a generous ground clearance of 200mm on our two loaders. There is a single range, with a claimed 20 km/hr travel speed. A combined brake/inching pedal applies the stopping

TEST ASSESSMENT

WEIDEMANN	1260LP S ROOF	1260LP CAB
ENGINE, TRANSMISSION AND RUNNING GEAR		
Fuel consumption	◉	
Tractive power/pushing power	⊕	
Maximum speed	◉	
Differential lock	⊕	
Manoeuvrability	⊕	
Lower Link mechanical flotation	⊕	
BOOM		
Lifting force/tipping load	⊕	⊕
Break-out force	⊕	⊕
Lift / dump height	◉	⊕
Dump reach	◉	⊕
Crowd/tip angle	⊕	◉
Parallel control	⊕	⊕
Shock absorbing system	⊘	⊕⊕
REMOTE SERVICES		
Dosing/mixing	⊕	
Cycle rates	⊕⊕	
SWAPPING ATTACHMENTS		
Carriage	⊕	
Locking system	⊕	
Couplers	◉	⊕
CAB AND CONTROLS		
Access/doors	⊕	◉
Seat/steering wheel	⊕	⊕
Joystick/3rd service	⊕/⊕	⊕/◉
Instruments/switches	⊕	
Pedals	⊕	
Noise level	⊖	◉
Stowage	⊖	⊖
VISIBILITY		
View on attachment, boom at ground level/raised	⊕/⊕	⊖/⊕
All-round visibility	⊕	◉
Mirrors	◉	⊕
Window wipers	⊘	◉
BUILD QUALITY AND MAINTENANCE		
Accessibility	⊕⊕	
Grease points	⊕	
Paintwork	⊕	
Overall build quality	⊕	

different grades only for differences in equipment
Grading: ⊕⊕ = very good; ⊕ = good; ◉ = average; ⊖ = below average; ⊖⊖ = poor ⊘ = not available

MEASUREMENTS AND PRICES

WEIDEMANN	1260LP S ROOF	1260LP CAB
ENGINE AND TRANSMISSION		
Engine	Perkins 403 J-17	
Engine power[1] (ISO/TR 14396)	18.4kW/25hp at 2,800rpm	
Maximum forward speed	19.8km/hr	
Maximum draft	1,377daN	
Diesel tank[1]	18 litres	
Fuel consumption	5.0l/hr	
REMOTE SERVICES		
Maximum oil flow[1]	45l/min	
Oil pressure	188bar	228bar
3rd service oil flow (residual pressure)	47.7l/min 38bar	48.3l/min 37bar
WORK RATES[3]		
Raise/Lower	3.8/2.9s	3.0/2.7s
Crowd/tilt	3.1/2.4s	2.4/2.4s
FORCES ACTING ON THE BOOM		
Tipping load near ground level (straight/articulated machine)	1,190/ 1,000daN	1,210/ 1,020daN
Continuous tipping load (straight/bent)	1,090/ 910daN	1,140/ 980daN
....at lift height	1.00m	1.00m
Maximum tipping load (straight/articulated machine)	1,640/ 1,370daN	1,530/ 1,210daN
....at lift height	2.10m	2.30m
Break-out force	1,100daN	1,130daN
HEIGHT AND REACH		
Maximum lift height	2.51m	2.71m
Dump height/ dump reach[4]	1.46/0.32m	1.84/0.51m
Crowd/tip angle	44/50°	47/37°
Parallel bucket control	– 4°	+2°
Parallel pallet fork control	+/– 1°	+ 7°
Bucket digging depth	16cm	16cm
DIMENSIONS AND WEIGHTS		
Weight	1,800kg	2,090kg
Turning circle[5]	6.37m	6.68m
Tyre size	27x8.50-15	315/55 R16
Length/width/height	3.25/0.98/ 1.96 m	3.30/1.19/ 2.00m
Ground clearance	19cm	20cm
Bucket capacity	0.54m^3	0.67m^3
Bucket depth	98cm	98cm
CAB		
Noise level	79db(A)	76.4db(A)
LIST PRICES EXCL. VAT AND ATTACHMENTS		
Base specification prices	£29,732	
Test specification	£30,447	£39,700

[1] Manufacturer information; [2] Transport with empty attachment, high full load percentage; [3] at full throttle with empty bucket, full lift or tilt travel; [4] at max. lifting height and max. tipping angle; [5] above bucket outer edge

A canopy is okay for work around the yard.

The canopy offers good platform access.

power, this offering good modulation and control.

The 1260LP is supposedly the first loader Weidemann has fitted with what is a new transmission system, with the design set to be introduced across other models at some point. Despite the drive system being new, tractive power and basic 'oomph' felt somewhat lacking. The on paper 1,380daN of driving force is pretty much on the money for this class of loader, and performance on the flat was sufficient but with a full bucket or round bale up front, both variants struggled up modest slopes. The key was to back off the throttle a little, this helping to prevent the transmission bogging down. Actual traction was good in as much that we did not experience any significant wheelspin on loose ground or less grippy surfaces.

The long and short of it

The first major differences in specification between the test candidates relates to lift height, Weidemann offering a

The cab doors open fully and can be latched back.

The longer boom option does not offer as good a view as the shorter alternative, operators needing to look to the side to get the best view.

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choice of three of up to 2.90m. Our entry-level machine had the standard boom with a lift height of 2.51m, the higher spec cab model featuring a 2.70m boom, a £500 option.

Both booms raised loads to their listed heights and reach, with comparable tipping loads. With optional ballast and a factory-adjusted maximum oil pressure, the higher reach boom delivered better crowd and tip performance at ground level, the short boom doing the same at near maximum lift height although in both cases neither result would show up in practice.

As far as the kinematics, the shorter boom delivered a greater dump angle and kept pallet forks almost perfectly parallel. The bucket, on the other hand, tipped out slightly in the middle lifting range. Things were the other way round on the long boom: bucket control was almost perfect, yet the pallet fork tilted quickly in low position. These anomalies were as we would expect and should not prove a concern.

The greatest difference between the loaders was the higher attachment point of the long boom proving a negative, the attachment hoses routed so they restrict visibility. This caused the operator to look to the sides of the boom to get a better view of the load. Our models had optional light brackets fitted to allow them to travel on the road and this £1,205 option added further obstruction to the view.

We found the smaller boom on the entry-level loader much tidier and less cluttered, with a good overview of the entire loading system. On the flip side, the higher spec cab model was fitted with switchable vibration damping. This £1,000 option proved popular with operators.

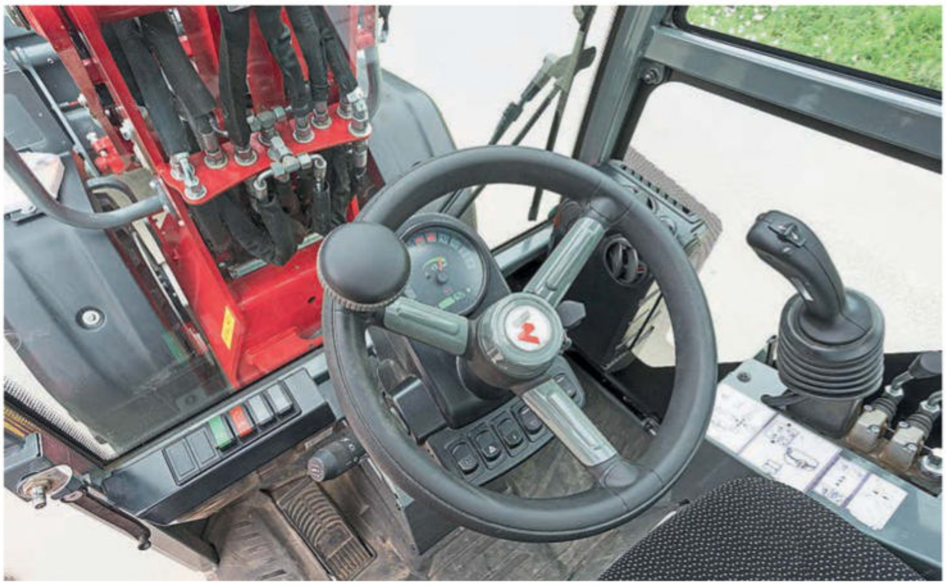
OUR DESIRED EQUIPMENT

WEIDEMANN
1260LP

- 2.51m lift height boom
- Boom damping
- Canopy
- Third service control on the joystick
- An air suspension seat
- 100kg rear ballast
- 315/55 R16 tyres
- Clevis hitch

Price to above specification £34,000

A longer boom at £500 and additional lights for £1,200 may be desirable for some applications, but we prefer the above spec. All prices ex-VAT.



The controls are simple and well placed.

Integrated coupling

Both models of the 1260LP delivered a measured hydraulic flow of around 48l/min, slightly higher than listed in the specifications. This high flow delivered fast movement in the loader arms, whilst mixing functions with the sensitive joystick proved snappy with good control.

Both loaders were equipped with a third service, the cab 1260LP benefitting from an integrated control on the joystick, with a separate control lever on the entry-level model. The integrated control is a £860 option and one worth considering if you are going to use the third service regularly.

A further option fitted to the cab 1260LP was an ECS easy coupler system. The hydraulic couplers and connectors are integrated into the attachment carriage. This worked well, if the mating faces are clean, and is a great help where attachments are swapped frequently. The system will only operate with compatible attachments and is liable to damage if not.

Cab comfort

The most obvious differences between the two test candidates relate to the driver platform. On the platform roof canopy model, the simple doors open to about 90°. There are no access steps and jumping on an off the machine is easy. The only hitch is a bulky panel under the steering column which can restrict the right foot on occasion.

The cab model has a swivelling pillar steering column, the base resting on a load-bearing fairing to make room for the windscreen. Fine for the feet but the cab entrance is narrower higher up unless the full swivel range is used to move the column closer to the windscreen. This setting puts the steering wheel at a shallow angle, correcting this then making it harder to get in and out of the cab.

On cab models, the doors open fully and can be locked back but there is a small lip on the threshold necessary to seal them when shut. This can catch your foot when leaving the cab although you can at least store something next to the seat with a reduced chance of it sliding out.

The driver seat can be a basic shell through to one with air suspension and seat heating. You get what you pay for, with a suspended basic seat perhaps offering the best balance between comfort and price. Thanks to the machine's simple design, both the canopy and the cab variants are blessed with simple controls. The joystick is located on the right-hand console where it falls readily to hand with the other controls around the steering column. All easy to get at and use. The cab version features heating and a ventilation, neither of which we had reason to use during the test period.

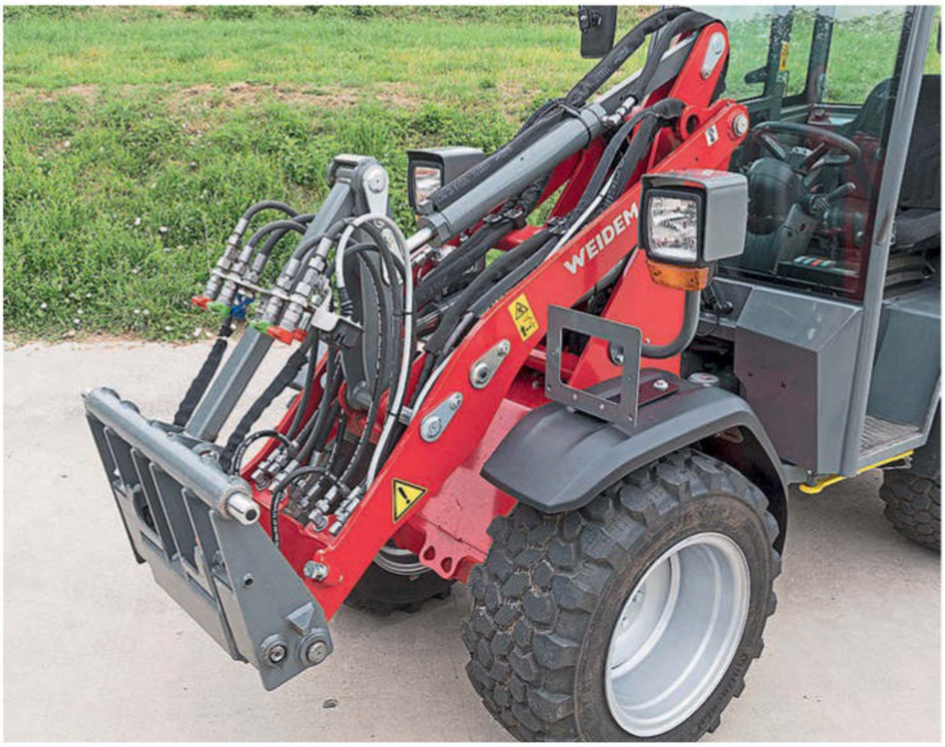
Other details

- A 100kg rear ballast can be fitted as a £590 option. Water filled are also available for an extra £770.
- The adjustable steering column is a £260 option on frame and canopy models.
- A £205 clevis hitch is available.
- A fourth service option is offered for £1,223; a no pressure return for £205.

Summary

The Weidemann 1260LP, in either specification, proved a great yard-friendly handler even if the four wheel motors of our test units lacked the expected pep. A key for buyers is that these models can be specified to match individual needs. We list our preferred configuration in the 'Our desired equipment' box.

Frank Berning



The attachment carriage comes with a choice of an integral locking system to include coupling for the third service. Requires compatible attachments.

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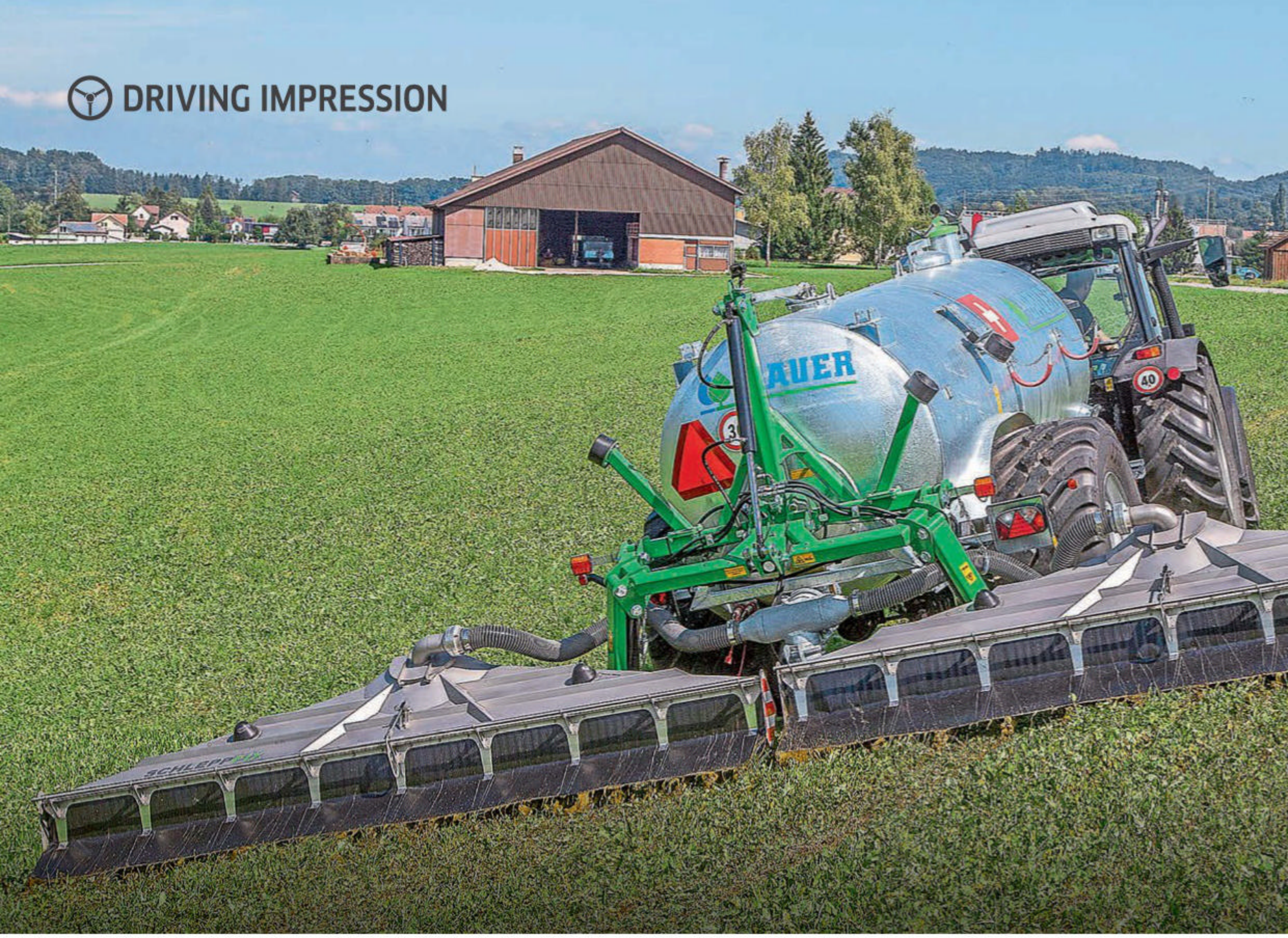


Brunner Schleppfix SFA7 slurry applicator:

Low emission simplicity

It's not a splash plate, and it doesn't have a distributor. So, is the Schleppfix the ultimate in trailing shoe simplicity? We find out.

It sounds like nirvana for tanker owners: no wear, no additional drive and, in the event of a blockage, you don't need any tools to fix the problem. The Schleppfix distributor seems to have what it takes to become the new benchmark in trailing shoe applicators. But where are its limits? And what sort of job does it do?

Before we can answer these questions, we should explain how the applicator, which is made from stainless steel and powder-coated steel, actually works.

Up to 11.5m wide

Swiss firm Brunner offers the Schleppfix in three working widths: 7.20m, 9.00m and 11.50m. According to the maker's spec sheet, these weigh in at 570kg, 680kg and 980kg, respectively. The two smaller units fold in half for a transport width of 2.55m and can be mounted on a tanker up to 1.70m in diameter. By adding a central frame, larger tanks up to 2.00m can be accommodated, but this pushes the on-road width out to 2.95m.

The 11.50m model, the SFA12, has a three-section boom for fitting to tanks up to 2.10m in diameter (with a folded width of 2.55m).

All three versions are attached to the tanker via a Weiste A-frame with one latch on either side; the frame attaches to the tank, and there is a brace on the top. Other coupling options are also offered.

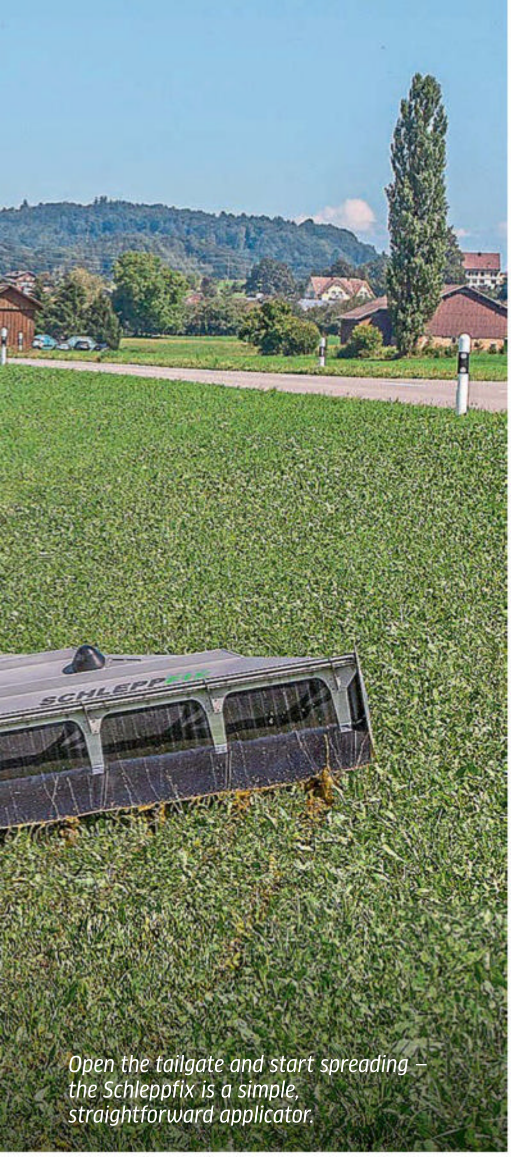
The Schleppfix doesn't require a hydraulically powered distributor or macerator. The slurry

KEEPING IT BRIEF

The Schleppfix places the slurry close to the ground and doesn't use a powered distributor/macerator.

All of the main distributor components are accessible without tools, making it very easy to clear blockages.

It evenly distributes the slurry across the full working width of the machine, even on slopes.


Open the tailgate and start spreading – the Schleppfix is a simple, straightforward applicator.

flow is divided left and right by a tee-piece at the tanker outlet and then flows through 9cm hose to the stainless steel distributor box on the left and right wings.

Slurry chute

From here, the slurry shoots through a semi-circular nozzle onto a patented splash plate made of plastic. Like an orange juicer, this has plastic grooves that fan out, splitting the stream of slurry evenly into stainless steel channels. In doing so the slurry picks up so much speed that it has to be slowed down before it reaches the outlets. This is done by a rubber curtain placed over the outlets, with vulcanised canals to help direct and slow the flow before it reaches the shoes.

The Schleppfix is best suited to shorter grass, as the comparatively light applicator is not able to push its way through taller plants, with the end result that the manure is left on top of the sward.

We really liked the access to the distribution box. Should the nozzle become blocked, it's just a matter of opening the two over-centre latches and swinging the lid back, and you're in without needing any tools. The deflector also folds out of the way so that any blockages in the channels can be easily cleared – but you are going to come into direct contact with the slurry, so pack some gloves.

Better than baffles

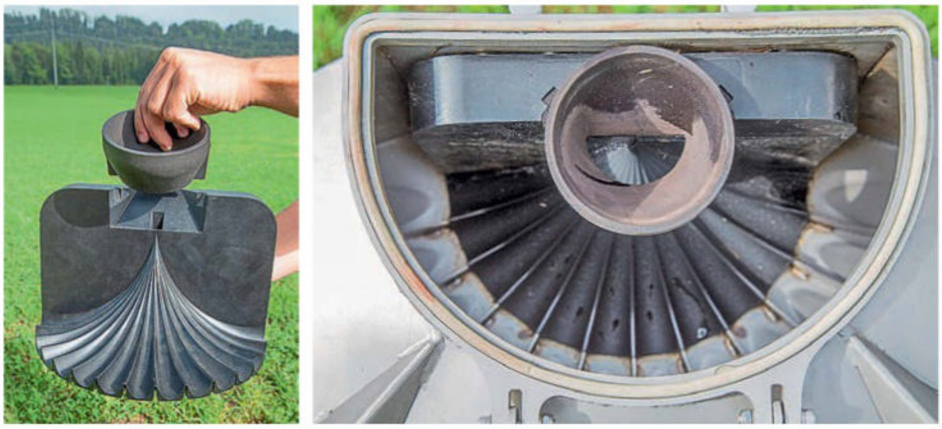
The nozzle and the distributor plate form the heart of the machine. Similar to a splash plate, the flow and therefore the working pattern are influenced by fitting a different size of nozzle. This is shaped like a semi-circle at the lower end. According to Brunner, application rates of 25-30m^3/ha are possible with the medium nozzle at 6km/hr.

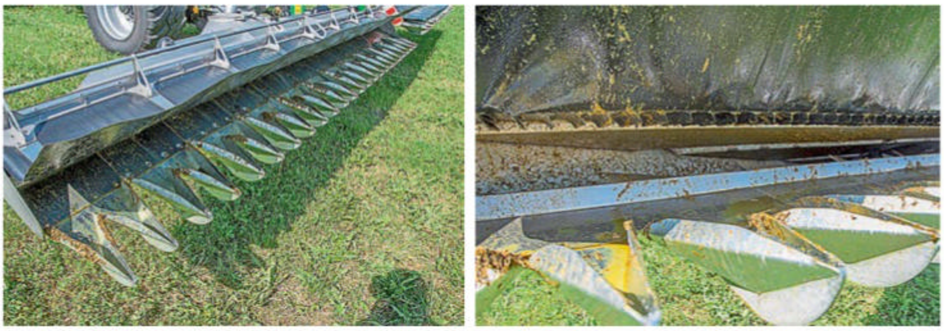
Ideally, especially on slopes, the tanker is sending the slurry out at 0.6-0.8 bar. This ensures all of the shoes are applying an equal amount, even on slopes. The manufacturer does not expect the distribution across the

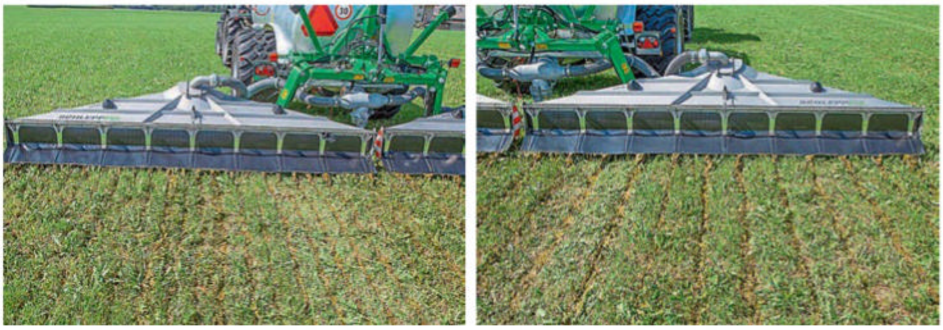
DATA SHEET

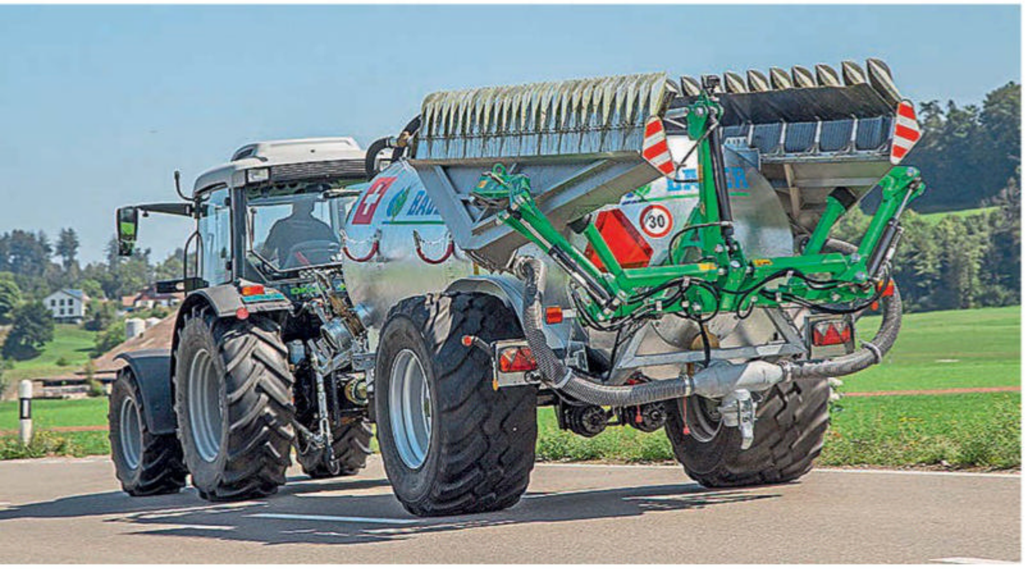
Schleppfix SFA7	
Work width	7.20m
Transport width	2.55m
No. of slurry tubes	24 (48)[1]
Spacing of runners	30cm (15cm)[1]
Kerb weight	570kg
Hydraulic spools	One double-acting
Price	From €24,800

Manufacturer's information; [1] with Duofix runners

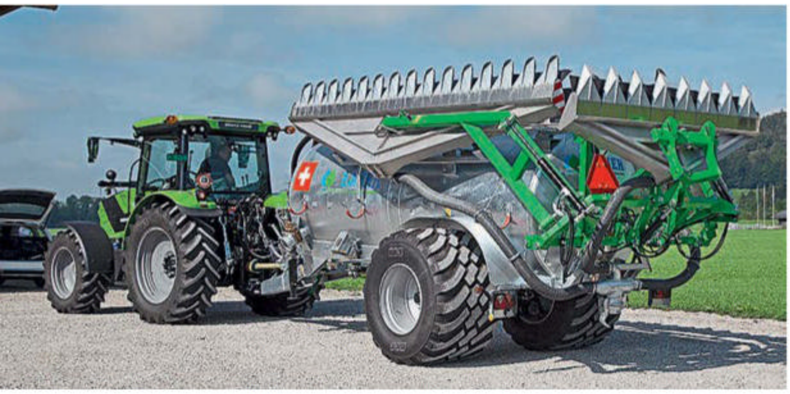

The slurry gushes onto the chute below, with the flow of material split across the fanned-out ripples. Right: The view from above of the replaceable plastic distributor. The slurry is directed onto the plastic ripples and fans before entering the stainless steel channels that you can see in the right-hand photo.


The slurry then flows along the individual channels to the runners/shoes. The rubber curtain (which has been lifted up for the photo) helps to contain the slurry flow while providing easy operator access.


The slurry strips are wider and less precise than on a conventional trailing shoe with steel spring runners. We would strongly recommend the 15cm shoe spacing shown in the photo on the left.



The booms fold along the sides of the tank for a neat on-road package.



This is the three-section boom, which boasts a working width of 11.50m.

WHO IS BRUNNER

Thomas Hollenstein is the owner of Brunner Spezialwerkstatt, founded in 1994 in Schwarzenbach, Switzerland, about 60km from Zurich. Today, the company employs around 23 people at two locations and, in addition to repairing farm machinery, concentrates on manufacturing Schleppfix machines. In addition to slurry kit, the firm also produces equipment for the industrial sector.

rows to be at the same accuracy as from a powered distributor, but it should be better than a traditional splash plate.

Strips and splashes

In general, the spread pattern is different from an actively driven macerator, as the slurry doesn't lie in a neat strip that is isolated from the plants. Due to the pressure in the distribution box, some droplets will wet the plants growing next to the strips. With double the number of shoes, this trait is halved.

We really liked the contour following. Thanks to the split boom, the left and right wings can adapt by pivoting at their centre. There is also a clever rotating linkage pin connecting the two arms so they move in unison, one pushing the other down.

Steel springs connect runners to the boom. Brunner recommends an angle of 35° to 40°. Another advantage of the design is that you can still turn with the applicator running on the ground.

A controller, not a terminal

The Schleppfix tucks in tight to the back of the tank, with the folding rams having end-of-stroke damping on both sides. When folded for transport, the shoes are inverted, so any remaining liquid flows back and is contained in the stainless steel box. The rubber cover also catches any slurry from the shoes. It's all very well thought-out.

One spool is all that it takes to operate the applicator, plus one other for the gate valve on the tanker. A mechanical linkage controls the sequence of the boom unfolding as the cylinder extends simultaneously lowering the applicator. The whole process takes just 10 seconds to complete.

The distribution thing

So, much praise for the simple technology. Is there a catch? With the very thin slurry we applied, the application quality was OK. But with a thicker slurry you still get the slurry sausages you see with a dribble bar.

For this type of situation we would definitely recommend the Duofix runners, which reduce row spacing to 15cm. In Switzerland, Brunner is legally required to offer a 30cm spacing, but then the actual slurry strips are even wider and form a really noticeable band of thick manure.

If you are looking for a simple distributor for short grassland, the Schleppfix is certainly a good choice. But conventional trailing shoe set-ups still have the upper hand for working in taller crops.

Other details

- The runners/shoes are made of wear-resistant Hardox steel.
- Working widths larger than 11.50m are not planned.
- The pipework to the applicator could be refined.

Summary

Brunner is breaking new ground in slurry spreading with the Schleppfix. The wear and maintenance costs are reduced, as there's no macerator to service, and its ability to follow ground contours is impressive.

The spreading pattern is different: the bands of slurry are wider. But even the near €25,000 Schleppfix can't place thicker slurry invisibly into grassland.

Niklas Franke, Tobias Bensing

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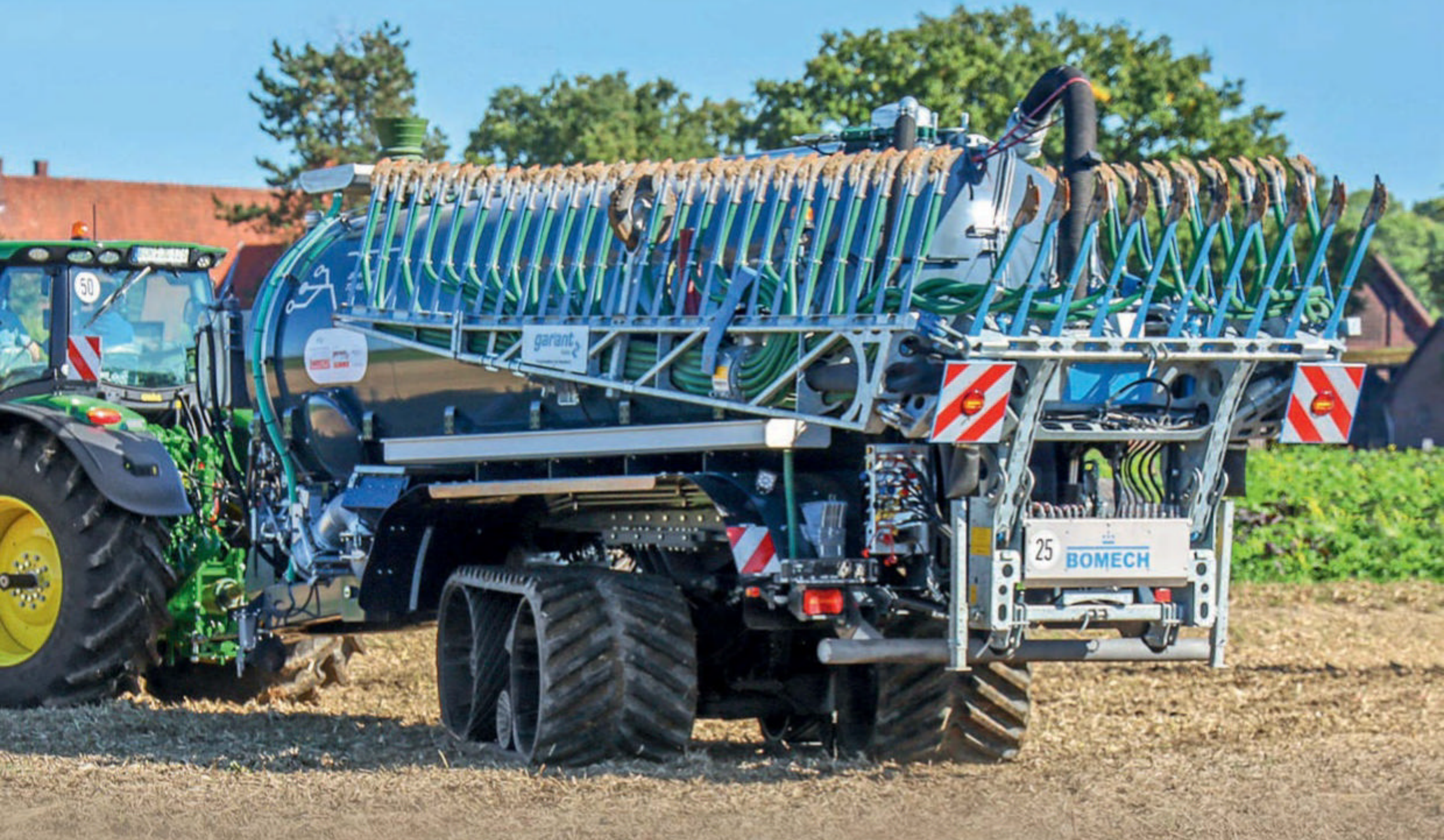
Kotte Garant Smart Traction:

Tanker on chopping shoes

The idea of putting a slurry tanker on tracks certainly isn't a new one. But Kotte has now added an important extra function with its Smart Traction, a steering system to better take care of the soil and the crop.



The tracks can steer by as much as 19° to help keep the tanker within the tractor's wheelings when at the headland.

At the start of the slurry spreading season (as well as the end of the spreading season, for that matter) the field conditions in question can generally be described as 'soft'. So, with smaller spreading windows on offer, farmers are looking for ways to look after their soil and the growing crop. Given this scenario it's easy to see the appeal of the extra flotation from tracks. But then the flipside of this long footprint is scuffed headlands.
With all of the above in mind, Georg Große Böckmann with Prof. Dr.-Ing. Hubert Korte, research assistant Sascha Groß-Hardt, from Osnabrück University of Applied Sciences, and German manufacturers Limberg and Kotte have been working to get the most from tracks on a tanker.

Assisted steering

When the tracked Kotte slurry tanker makes a turn, it becomes clear why such a great deal of thought and effort has gone into the design. The hydraulically driven rubber track units, which are sourced from Claas, help the turn on the headland, while the Ackermann steering also encourages the tanker to follow the path of the tractor through a curve, the

KEEPING IT BRIEF

The steering angle is measured electronically on the Kotte tanker drawbar.

The rubber tracks are sourced from machine manufacturer Claas.

Empty, the Kotte tanker weighs in at around 16.6t.

steering angle of 19° giving accurate tracking even on 15m wide tramlines. This amount of movement means crab steering is also possible.

The footprint for both of the 890mm wide tracks is an impressive 3.25m^2. Each track is rated to carry a load of 14.8t (17.5t when the undercarriage doesn't have suspension), and transport width measures 3.00m.

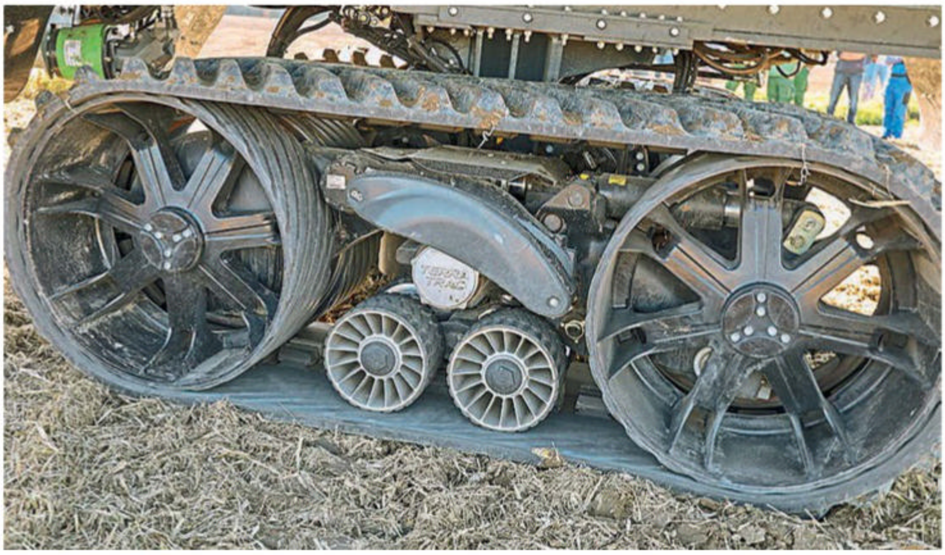
The TerraTrac running gear, which is employed on Claas's tracked Jaguar forager, has a neat feature in that the central idler wheels can be dropped down to reduce the track's total contact area around curves. This minimises the damage to the crop, especially grassland, when turning on the headland.

USER EXPERIENCE

Prototype in use

Georg Große Böckmann is the man behind the steering tracked tanker: "I'm very happy with the tanker; even on grassland the tracks leave hardly a mark at the headland." On top of that, the positive impact of the steering system has also surprised him. "This, in combination with the tracks, makes for a very gentle footprint and minimal crop damage. The only place where the tanker struggles is on the road, because the rolling resistance of the tracks is too high," says Georg. Next spring, he plans to use the slurry tanker with a strip-till maize drill.

"The effect of the steering system is much better than expected," comments Georg Große Böckmann.



The tank and chassis come from Kotte, while the running gear and hydraulics are supplied by Claas. It's an all-German affair.

However, the shorter footprint results in more pressure on the ground, so, for now at least, this feature is only being used on the prototype unit for research. And it can also only be operated when the tank is empty.

Maximum 150kW

The powered tracks require an oil flow of 260l/min at 350 bar, which explains why the tanker has its own on-board hydraulic pump with an 80-litre oil tank.

A drop box transfers tractor power to the hydro motor positioned between the axles. There are five travel ranges, both forwards and reverse, with a top speed of 20km/hr in the field, and the outfit needs to travel at a minimum of 0.5km/hr, as not all tractor transmissions can deal with the significant pushing power generated by the tanker. As a theoretical example, a max of 150kW can be transmitted at 8-10km/hr travel from the 1,000rpm pto. For all steering manoeuvres, supplying oil to the suspension cylinders and the grass mode (both optional), the Kotte tanker calls on the tractor's Power Beyond load-sensing hydraulics. Another optional feature is the tanker axle shifting to one of five positions to balance the drawbar weight with the applicator on the back.

When crab steering is activated in the field, the tanker's steering angle is limited to 8°.

To prevent heavier applicators taking too much weight off the tanker drawbar, the axle can be moved back and forth hydraulically and then mechanically locked in place.

On the product pumping front, Kotte has installed a hydraulic centrifugal pump from Euro-P with a capacity of 6.5m^3/min on the 19m^3 tank. A Jurop vacuum pump is used to fill the centrifugal pump and also assist by supplying pressure when emptying. The on-board hydraulics produce the power for the centrifugal pump, and it's this that allows the forward speed and the application rate to be controlled independently.

A high-pressure linkage with stabilisers is available to reduce the load of the applicator and the steering on the tanker. There is hydraulic drawbar suspension, too, for better operator comfort. The tanker is designed to stay in the field and do the spreading, as it's a heavy pull on the road.

Future outlook

For now the tracked tanker is still a research project. Sascha Groß-Hardt is studying the advantages of tracks to work out the added value for practical applications as part of his PhD, with his main focus being on sustainable crop and soil protection, especially on grass. The project is expected to produce its first results later this year.

Niklas Franke

AGROMEC
ZERO-EMISSION

No exhaust, no emissions – the 800 volt electrified Vario delivers around 150kW/200hp, which is generated by an electric motor instead of a diesel motor.

Agromec 700 Vario electric tractor:

205 electric horses

Dutch Fendt importer Agromec, together with Electric Construction Equipment, has 'electrified' a Fendt 700 Vario by fitting an exchangeable battery on the front linkage. Our friends at Trekker magazine in the Netherlands have been for a first look.

How can the energy from 400 litres of diesel be replaced by an all-new 'emission-free' driveline? This was the intriguing challenge given to Mart van der Valk, of Electric Construction Equipment (ECE), on behalf of Dutch Fendt importer Agromec as well as the construction company Van Wijlen.

Hydrogen or battery?

One possible option was hydrogen. However, this is not only currently expensive and has a limited energy density, but the required fuel cell is also expensive.

The second option was a battery pack that could be installed on the tractor. Yet this also proved to be impractical, because a battery capable of providing the same run time as 400 litres of diesel would weigh around 15 tonnes. Enter the exchangeable battery that could be mounted on the front linkage, the exchange taking only a matter of minutes and allowing work to continue. So, if enough batteries are available, you can continually work with electricity. But we're getting ahead of ourselves. Let's start at the beginning of this project's story.

720 Vario as the starting point

Agromec used the Fendt 720 as the basis for its electric tractor. All of the components that relate to the diesel engine are removed: the tanks, radiators etc and, of course, the exhaust stack. Then a permanent-magnet

KEEPING IT BRIEF

Agromec converts the 700 Vario from diesel power to electricity. The transmission, chassis, hydraulics and lift linkages remain unchanged.

A 2.0t exchangeable battery carried on the front linkage powers the tractor for more than three hours of medium work. The battery swap takes just a few minutes.

The tractor costs €500,000, while each battery pack is €115,000.

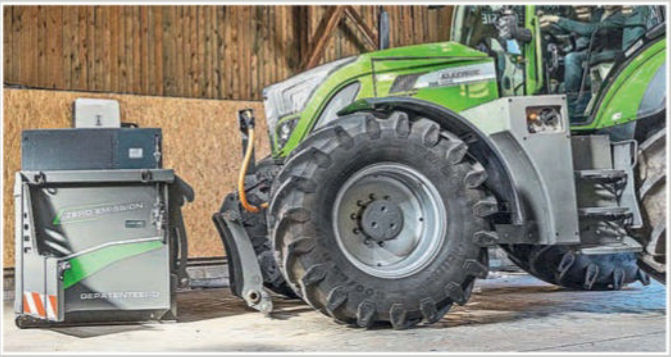
Danfoss synchronous electric motor is installed. Measuring just 45cm by 65cm, the vibration damper fits into the chassis frame of the tractor.

The 800 volt unit can deliver a nominal 300kW/410hp+; however, this was tuned down to produce 150kW/200hp to match the performance of the Deutz diesel burner and not overwhelm the Vario transmission. Agromec then uses the remaining space under the bonnet to install a 70kWh battery pack to ensure the tractor still has power available when the exchangeable battery pack is not in place.

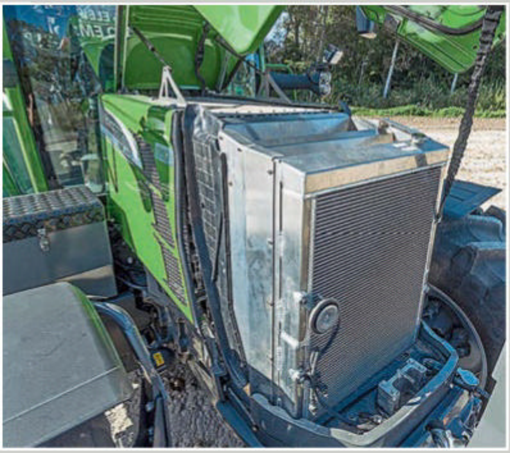
The firm also installed a cooling system with two fans, as the electrical components need to be kept below 45°C.

12, 24 and 800 volt

While there is a drive in the 800V system for the air compressor, Agromec had to opt for a 24V system for the air-conditioning compressor, which is integrated into the roof but is no longer operated via the Fendt display; it now has its own separate controls. The tractor has three different voltages (12, 24 and 800 volts) and two inverters. These, together with all of the other components, including the Power Distribution Unit (PDU), fuses, control technology and main relays, are located behind the cab on the left-hand side where the diesel and AdBlue tanks previously lived. This has also resulted in the steps being steeper than on the original Fendt 720.



The shortened front linkage has a Volvo loading shovel quick-attach carriage for hitching up to the 2.0t battery pack with 140kWh. The control system includes the fuses and master switch that now occupy the space vacated by the diesel tank.



The cooling system is complex. The electric motor sits low down in the chassis: above it is a 70kWh battery; in front of it is the cooling system for the electrics.

Charging state, temperatures, utilisation etc are shown on a separate display. Otherwise, the machine is operated just like the conventional tractor.

Removable battery

The interchangeable battery found on the front linkage is the same unit that ECE uses in its electric construction kit. It is a good 1.00m deep, 1.30m high and 1.30m wide and weighs around 2.0t, with the cooling and heating unit on top. This ensures that the unit is always kept at the optimum temperature range to utilise the full capacity of 140kWh.

For lighter work, where the diesel engine would usually consume around 8l/hr, the battery pack is sufficient for around 3.5 hours of runtime. But if you work under full load, the battery is flattened in less than an hour.

To make moving the battery packs relatively easy there are forklift pockets and crane eyes, as well as the quick-attach couplings for the Volvo loaders that the business also operates. Once the battery is in place you only have to plug in the tractor with the 250 amp plug, and you are ready to go again.

Short test drive

In the cab, the differences over a diesel-fuelled 720 are the separate climate control panel in the roof, and there's also an extra screen next to the Vario terminal that shows the battery voltage and temperature.

When you turn the ignition key there is just a slight hum. This is a mix of the whirring air-con and the electric motor and the Vario transmission, which keeps the tractor at an active standstill at around 800rpm – just as on the oil burner tractor. Pulling away is also just like a diesel-fuelled 720; the response from the accelerator pedal is just the same. When you start to climb a hill with a loaded trailer you just miss the bark of the engine, the electric motor simply getting on with the job of propelling the rig up the slope.

How much!

Now before you all go rushing over to the Netherlands with your cheque book in hand, we should point out the Agromec price tag: each front-mounted battery pack is priced at €115,000, while the converted 720 is a gob smacking €500,000.

And then, of course, you'll need the quick-charger, which, according to Agromec, takes about an hour to recharge the battery. Also, if you want to work non-stop, you need at least one additional battery.

For contractor Van Wijlen this seems to have been a worthwhile investment, because the business has already taken delivery of a second electric 700 Vario.

And, according to Coen Loeffen, the product manager at Agromec, the company is planning to convert as many as 15 to 18 tractors this year, which would be around 10% of all the Fendt tractor models sold by Agromec in the Netherlands each year.

Bob Karsten, Hubert Wilmer

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JOSKIN
MODULO2 6000

Year: **2000**

Condition: **Good**

Comment: Simple specification single axle 6m^3 tanker on flotation tyres. Good working order, rare low use model.

Price: **Circa £5,000**

JOSKIN
VOLUMETRA 18000

Year: **2018**

Condition: **Dealer prepared**

Comment: 18m^3 capacity High specification includes articulated self-fill, forced steer tandem axle, Automaton control, 50% 750 tyres and 12.0m Penditwist applicator

Price: **Circa £70,000**

JOSKIN
VOLUMETRA 26000

Year: **2019**

Condition: **Good**

Comment: Factory prepared base 26m^3 tanker fitted with steering triple-axle and 95% 650/55 R26.5 tyres. UK dealers have access to continental used models sold through the Joskin network. Potential source of less common specification machines.

Price: **€93,000 (plus transport costs)**

Joskin slurry tankers and application equipment:

Capacity and condition key to best used buy

Instantly recognisable with their galvanised finish, Joskin slurry tankers and associated application equipment are available to cover the demands of small livestock farms through to the largest of contract and AD plant user needs. There is an almost baffling range of units on offer but start from tanker capacity and selecting a used buy will be a lot easier.

It is not unusual for the purchaser of a Joskin slurry tanker and applicator system to keep the combination for more than 10 years, typically only trading it in for a machine with higher capacity and a wider applicator. Nor is it rare for sound older kit to sell for more than it may have cost when new.

This preamble is to warm used buyers up for some simple points. Joskin equipment made back in the early 2000s or even 1990s will not necessarily be 'cheap' and Joskin dealer trade-ins seldom reach the retail market as they will already have a buyer lined up. A further consideration is that Joskin kit can be upgraded and modified, with sensible spare parts pricing making it cost effective to refurbish worn machines.

Key models

Take a glance at Joskin marketing material and delve deep and you will find there is a great deal of choice on offer, with numerous build options. In the UK, however, Joskin sales over the past 20 years or so have tended to focus on a few key models, with the odd machine purpose built to meet specific needs of certain specialist customers.

Modulo2: Fitted with a single axle and sold in 11m^3 capacities, these tankers were typically offered with a 4.0m applicator when new. Expect more common used examples to be 20 years plus in age with strong demand

JOSKIN
MODULO2 12000 MEB ADVANTAGE

Year:	**2023**
Bale count:	**39,000**
Condition:	**New**

Comment: A tandem axle Modulo2 with 12m³ capacity is now more likely to be seen as an entry level machine for UK users, the Advantage specification package enabling dealers to carry a stock tanker with core options included plus fittings to allow easy upgrades to match specific customer requirements.

Price:	**Circa £36,000**

JOSKIN
VOLUMETRA 16500D ADVANTAGE

Year:	**2023**
Bale count:	**39,000**
Condition:	**New**

Comment: Volumetra tankers with a 16.5m³ capacity are core models for contract and large farm operation. Fitted with a hydraulically suspended drawbar, hydraulic rear suspension and steering tandem axle, this Advantage specification model has the benefit of allowing easy upgrades.

Price:	**Circa £59,000**

from smaller livestock farms. Further up the Modulo range are models of up to 18m³ with a tandem axle. These can be fitted with applicators of up to 15m. Larger Modulo models will tend to be younger and may have a specification that will make certain upgrades easier and less expensive.

A key Modulo design feature is that the chassis is integrated into the tank, reducing the tankers overall height and with it reducing the centre of gravity with obvious advantages.

Komfort: Higher capacity tankers with barrel on chassis design that can be fitted with larger and heavier spreading attachments. Offered in capacities from 8.4m³ to 18m³, these models are extremely robust but are taller with a higher centre of gravity. Linkage bolted directly to the chassis with no stress on the tank barrel.

Volumetra: These models eventually took over from the Komfort range in 2017, the first models appearing in 2013. The name references the tanker originally featuring a spiral volumetric lobe vacuum pump but the key development is a move to an integrated chassis. This, like on the Modulo, reduces the tanker's overall height with the Volumetra having a more robust build to allow working with heavier and wider attachments. Pre-equipped for a built-in linkage and fitted with a side manhole. Choice of hydraulic suspension, drawbar and steering tandem axles.

Offered originally in capacities from 10.5m³ to 20m³ on tandem and 18.5m³ to 26m³ on tridem axles, the range from 2017 spanned 12.5m³ to 28m³.

X-Trem: Aimed at contractors typically doing a lot of road work over relatively level terrain, these models can be fitted with taller tyres and are designed to operate heavier implements. They are built to withstand intensive, demanding use although all Joskin tankers are robust. The downside to the

FACTORY RESOURCES

The Joskin website, (joskin.com) has a Find and Buy section that may be a help in sourcing or valuing a used machine. Online parts books can be viewed from the site and are accessed by entering a tanker's serial number. With this information, the unit's factory build can be looked up.

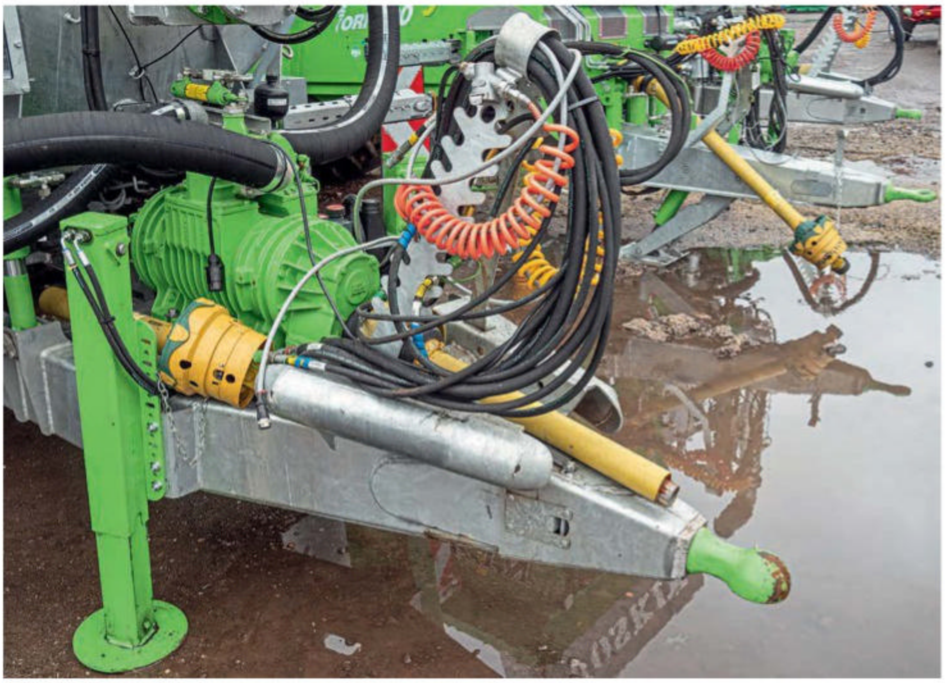
As well as listing prices of new models, the site enables tankers to be configured with options to provide list pricing.

ADVANTAGES OF ADVANTAGE SPEC

Joskin tankers are typically a bespoke build to customer specifications, but the problem with this approach is that dealers can struggle to meet 'off the peg' demands.

To get around this, Joskin offers the Advantage specification to suit broad local market demands but with a build to enable various options to be easily added. A customer can buy an 'off the peg' tanker that can then be tailored to suit more specific needs. A typical example is the fitting of a top fill aperture. This is sealed off as standard but can be easily fitted with an hydraulic lid and access ladder. At the rear, a buttress to accommodate wider attachments will also be fitted, again enabling a tanker to be easily upgraded.

Because Advantage tankers are 'volume' built, with a fixed factory specification, they are more economical to produce. They can also be produced for stock when demand for bespoke builds is lower. If you come across a used example, it will be more easily adapted to any upgrades or changes you may want.



Volumetra hydraulic suspension drawbar with 1,000 rpm pto pump 80mm ball hitch. A ball hitch is an increasingly common fit, with an easy swap to a standard ring design. Note drawbar tyre buffers and hydraulic jacks, with two of these supplied on tankers exceeding 11m³. A single central jack or simple pad stand are fitted to lower capacity tankers.

The machine data plates will list tank and pump details, the machine serial number also being stamped on the chassis. The latter will link the machine to its original factory build to include the complete list of items fitted in the factory. Note holder for vacuum pump oil.

Covered by a galvanized steel cover, the on-board electronics and electrically controlled hydraulic valves are easy to access.

X-Trem is that they have a high centre of gravity. Capacity range 16m³ to 20m³. Current new Xtrem2 tankers have a heavy-duty built-in chassis like the Volumetra to lower the centre of gravity. Other new standard features include a high duty strength three-point linkage with automaton controller. The smallest standard tyre is 800/60 R32.

Euroliner: More specialist use for operation with a nurse tank, these big tankers have capacities from 20m³ to 30m³. Tridem axles were the default choice and are now standard on all models. Feature front axle lift with front and rear axle steering. A specialist tool typically for ring fence farms and anaerobic digester users.

The above models are the key UK choices. Other models such as the single axle Cobra, Tetrax and Quadra tankers are available but fewer found homes in the UK and Ireland.

Control systems

Eastmatic and Polymatic: Introduced in 2005 and still in use today, these units comprise a simple in-cab control box with electric switches to mechanically sequence the hydraulic valves operating material flow to the applicator.

Automate and Auotmaton: The newest in-cab electro valve controllers. Fully electronic, the system can be used for attachment sequence control, headland functions with touchscreen switching between arable cultivator, shallow disc, dribble boom or trailing shoe attachments.

ISObus: Joskin offers full ISObus control. This is a popular option for most new large capacity tankers fitted with section control as it integrates into the tractor's ISObus system. There is the option of an additional multi-function joystick.

Application equipment

Pendislide: Most common application system primarily targeting grassland. Fitted with a trailing shoe coulter, the applicator is designed

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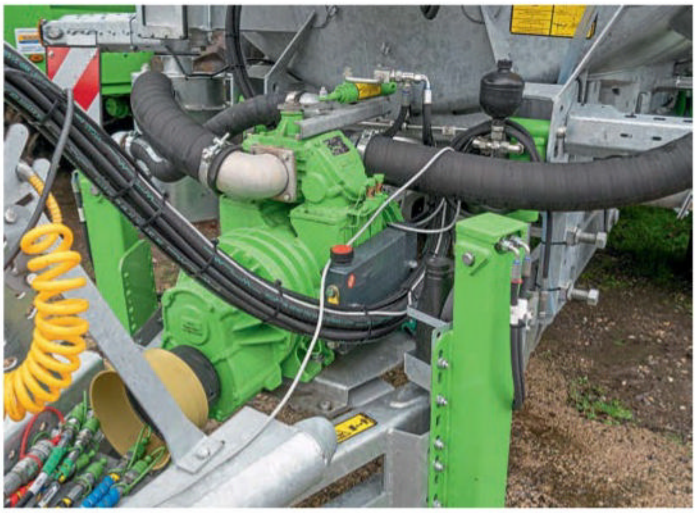
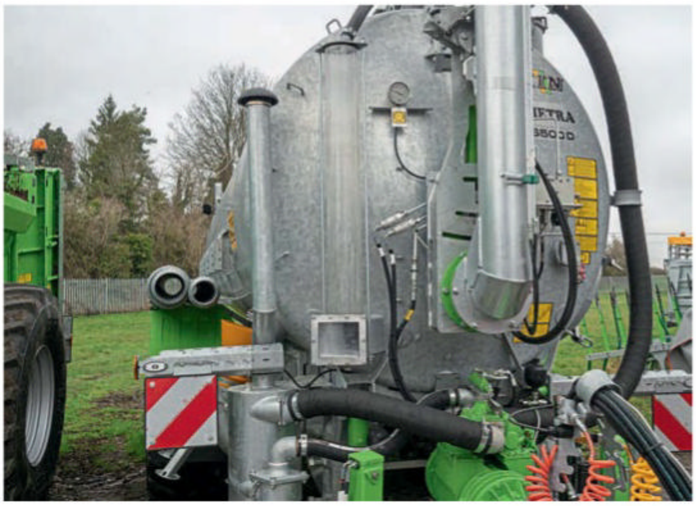


Don't get hung up by the capacity of the vacuum pump, Joskin fitting a pump designed to match the capacity of the tanker. Pumps do not come into contact with slurry and all designs can be rebuilt when showing signs of wear.



The self-fill lazy arm can be swung to either side, with the optional gauge providing a clear indication of the tank level of fill. Note the pump suction and oil vapour trap system, the latter having a tap at the base for a quick drain.

to form a furrow in the sward so the slurry is applied direct to the soil. Offered in working widths from 6.0m-18m, the applicator is fitted with a hydraulically driven macerator distribution system for consistent material flow and reduced blockages. Twin macerators fitted from 12m working width.

Penditwist: So named as it allows the applicator to accommodate sidling ground, the Penditwist is a dribble bar ideally suited to arable crops and open soils.

Solodisc: Shallow discs on double acting rear linkage developed to allow quick return of cattle to grazing pasture. Available to fit all models with suitable attachment buttress and four-point linkage system. Fitted with a Joskin macerator with high flow capacity. Operating widths are lower due to high flow capacity.

Multi-Action: The original trailing shoe mounted on single acting linkage with spring suspension. Good all-rounder as also fitted with a Joskin macerator. Coulter arms steer up to 15° either way for contour following.

Splash plate: All applications units are detachable, with a basic splash plate option available on the tanker gate valve or on the rear implement. This enables the spreading implement to remain in-situ with a splash plate applicator.

Attachment systems

The attachment systems can either bolt to the rear of the tanker or fit via a four-point linkage system. On Modulo2 tankers, a rear buttress option allows 7.5m wide arable attachments to be fitted with or without a four-point linkage mount. Attachments are interchangeable and designed to be easily fitted and removed. It is also possible to fit a new attachment to an existing tanker but seek advice before making assumptions.

Most Advantage specification tankers are fitted with added brackets and fill hatches to suit specific customer needs. This enables dealer to order an off-the-peg tanker that can be easily adapted to match specific user needs. These variants make a versatile used.

Running gear, tyres and other options

The tyre and running gear fitted to the tanker are, after tank capacity, the main things to consider when looking at a used buy. The range of tyre sizes, and type of running gear fitted, is considerable.

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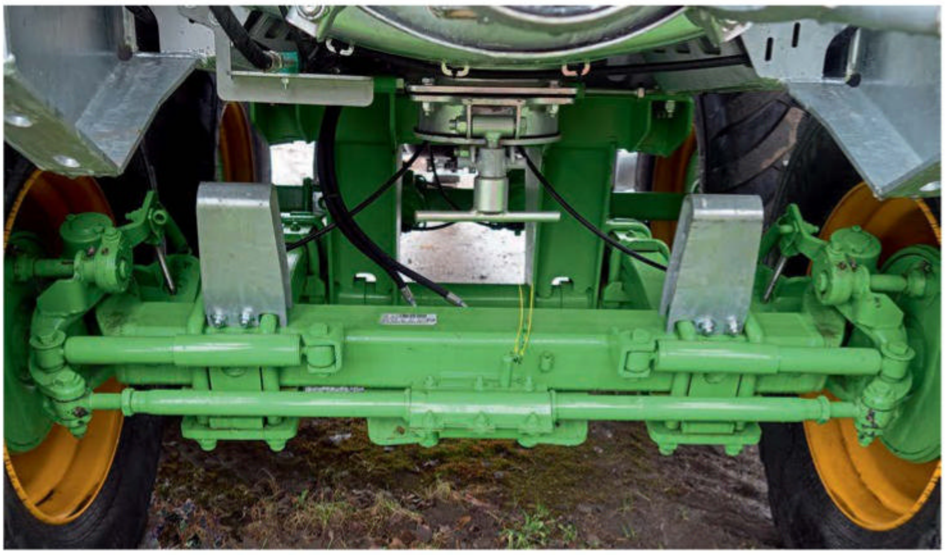
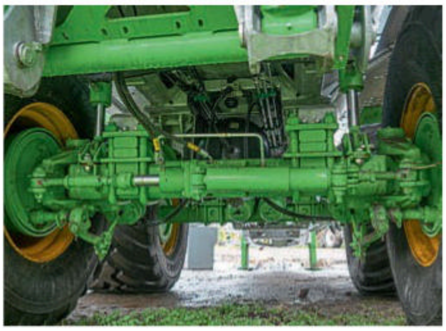
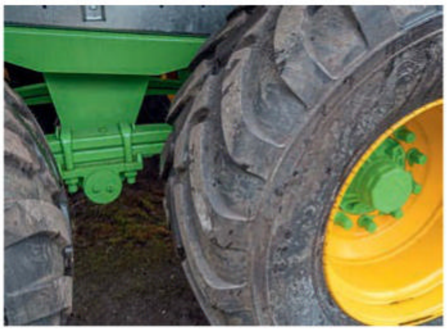
SCAN ME



A fixed rear tandem axle will not be a common find, a steering axle helping to preserve the tyres. Basic lockable design as pictured needs to be hydraulically locked when reversing.



An active steer rear axle is the 'default fit' for high specification tankers equipped with hydraulic rear suspension and air brakes. The suspension rams are easy to spot.



Rocking leaf sprung rear axles do a good job, the Joskin patented design putting the bogie pivot below the wheel centre to reduce the pull needed when working over soft ground.

Strong rear buttress mount allows attachments of up to 9.0m to be fitted and can also work with a four-point linkage system. Advantage spec models will usually have a buttress as part of its standard build.

Single axles: Well-suited to lower capacity tankers. Single axles have decreased in popularity over the past 10 to 15 years due to legislation, axle weights and poor road travel compared to twin axle tankers. Large single tyres are also expensive to replace and can increase the centre of gravity compared to tandem axle tankers.

Tandem and tridem axles: Most tandem axles will have some form of steering, rigid types subjecting tyres to severe wear so best avoided especially where there is a high degree of road work likely. Steering axles come in various types that need to be locked in transport or when reversing. A self-steering axle is a desirable option as it will steer at road speeds and also in reverse with the added benefit that it does not require a hydraulic function from the tractor.

Axle suspension: The larger the tanker, the more likely hydraulic load-sensing suspension and air brakes will have been specified. There are essentially two types of suspension offered, leaf spring and hydraulic. The former includes a Joskin patent design that positions the bogie pivot below the wheel centre to reduce pull in soft ground. Hydraulic suspension improves ride quality, stability, fuel efficiency and delivers load sensing directly from the axles for more accurate braking.

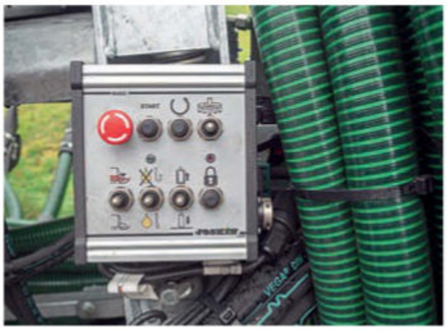
Drawbar suspension: Well worth having, even the most basic cushioned rubber designs can help improve how the tanker tows. More advanced pressurised hydraulic designs typically fitted to higher capacity models. If the latter loses its 'spring' it is typically down to failed accumulators, a simple and relatively economical fix.

Filling system: Self-fill and suction hose systems common. The Advantage series of tankers are usually 'pre-equipped' so that retrofit front loading arms and hydraulic top hatches are supplied in a simple nut and bolt fitting kit.

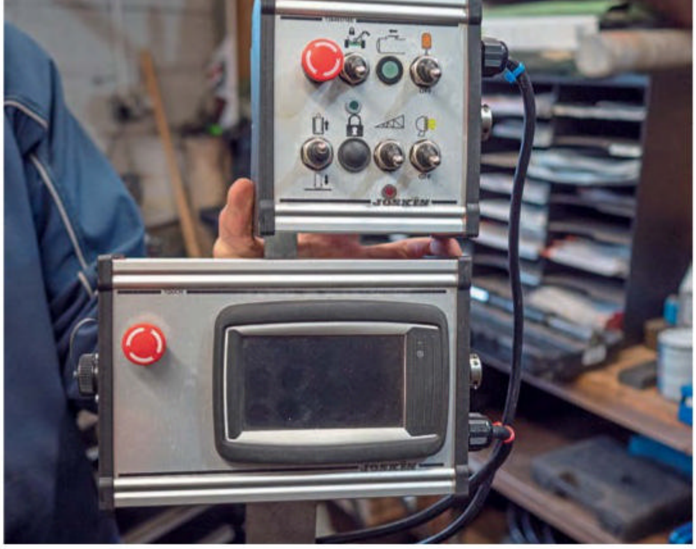
Turbo fillers: Include a hydraulically driven impellor to improve loading speed and to reduce 'frothing' during filling. Turbo fillers can be fitted to a self-fill system or directly to the tanker barrel if reinforced to counter vibration during filling.

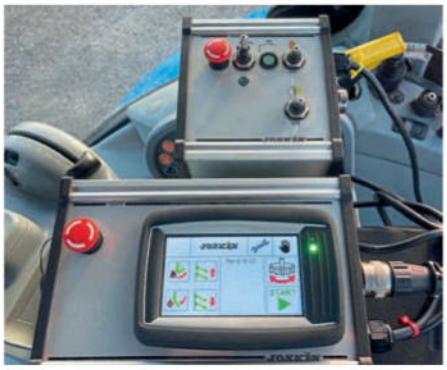
Volumetra integrated four point linkage pre-equipment and rear bump bar.

Heavy-duty four-point mounting on the Volumetra models will be suitable or all key attachments. Note hydraulic hose attachments to operate boom fold and drive twin macerators.



Simple Electro-Valve control will be fitted as basic equipment but ISObus control is starting to be the default choice on current tankers.





More advanced Automate and Automaton controls include a small touchscreen to operate functions such as section shut-off and headland turn features. As with Electro-Valve, many prefer to work the tanker via an ISObus control. You will get what you get with a used buy, but late models may be upgradeable.

Key checks

Job one is tyres. If these are worn or damaged, cost in replacements. If the tyres need renewing, and the tanker itself is priced to accommodate its need for new rubber, consider upgrading to a higher specification tyre.

Working back, typical checks should include the condition of the drawbar towing ring or ball receptor. Wear is hard to detect in the latter, but it will show when hitched up. The hydraulic hoses and connectors can be in poor shape on a non-dealer prepared buy, replacements having a heftier price tag than only a couple of years ago. Do not dismiss as a cheap fix.

Vacuum pumps can be rebuilt, dealer prepared tankers typically having the pump refurbished. It is hard to check a pump so assume it will need attention if the tanker is bought from a non Joskin dealer.

Tank barrels are tough (with galvanising making even an older model look tidy) and can outlive the tankers viability as a spreading tool. This is not to suggest you can just assume there are no problems, damage and a lack of maintenance causing potential problems on old tankers. Also look for fatigue cracks around the attachment brackets. An authorised dealer will not sell a tanker that has major problems, but other outlets can see abused units offered for sale at a tempting price.

Pendislide Basic 6.0m trailing shoe coulter applicators are fitted with a single macerator, with integral stone trap. Used examples need a good check for damage. Wear in the coulter shoes is best checked by comparing new and worn parts.

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Exacta-Cut macerator with large access flap to access the internals.

Pendislide units of 12m and above have two macerators. As with all units, look for damage.

Pendislide coulters are separate from the applicator outlets, reducing the cost of renewal when worn.

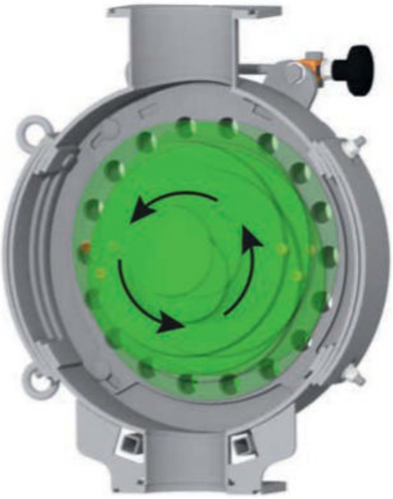
Applicator choices include the Solodisc shallow disc injector. Suitable for working in permanent pasture and allows a faster return to grazing.

If a tanker has done a lot of road work the running gear (wheel bearings, pivot points and brakes) will obviously be subject wear. Again, a dealer prepared tanker should not have problems, but still check.

Attachments need to be folded out and the wearing parts looked over to see if they will need to be renewed. Made from a hard-wearing polymer, the coulter shoes on Pendislide units are long lived, the best way to check for wear being to check worn against new parts.

Macerators will need periodic attention, with Joskin rebuild kits making it relatively simple and affordable to refurbish a worn item. The design of the macerators has, however, changed with the original multiple disc units giving way to a simpler single disc unit that is easier to service. Sand is a major cause of premature wear.

Is that it? Assuming the controller and related electronic and mechanical valves operate as they should this will be about as far as you can go with basic checks. A Joskin dealer prepared tanker and attachment should be sold ready to go, but if you buy from another source a Joskin specialist is worth talking to. It may cost a bit, but having a tanker fettled in a dealer's workshop can save money in the longer term.



The Joskin Exacta-Cut macerator fitted to smaller Pendislide booms has a 'rep-excentrique' cutting disc system. This is easier and less expensive to refurbish than the earlier multi-disc units.

What about prices?

Price will relate to capacity, condition, axles and the fitted attachments. Condition will clearly be important, although the finish on these tankers is good so they can respond well to some TLC. If you have a budget and know what you are after, contact a franchised dealer and see if they can help. If you are patient, the right tanker may come available with a bit of a wait. If you are in the need of something in a hurry, you could be out of luck. If used buy of the right spec is elusive, look at current new prices. These start at around

Steve Cooke and Charlie Jolliffe (right) suggest buyers contact a Joskin specialist for help when trying to source a used tanker and applicator. "Capacity and condition, as opposed to the unit's age, are the starting points," says Charlie. "Buglers have been selling these tankers for over 20 years and have sold over 1,200 units. We refurbish used examples and can rebuild pumps and macerators economically. A key plus with Joskin tankers is the ability to upgrade them and keep them working even when they are a couple of decades old".

Nurse tanker models are also available, this unit featuring a top mount transfer funnel.

Penditwist applicators can be fitted to a range of tanker sizes, to include single axle units fitted with flotation tyres. Pictured Cobra tanker will be a rarer find in the UK, this tall design with a 12.0m applicator as shown being more suited to level land.

£24,000 for an 11m^3 Modulo running a single axle, with a twin axle 12m^3 model selling from around £29,000, 14m3 examples nearer £32,000. Volumetra 16.5m^3 models with hydraulic suspension, steering axle, self-filling and Advantage future proofing are priced from around £58,000.

Pendislide applicators are priced from £8,500 for a 6.0m unit, a double macerator 12.0m unit weighing in at £25,500 plus.

Summary

A used Joskin slurry spreading system should be viewed as a longer-term investment. If you are after something to 'do the job' for a short-term project, a cheaper 'painted' model could be a better bet. A point to note, however, is that the residual value of a used Joskin could make it cost-effective buy.

With thanks to Steve Cooke and Charlie Jolliffe, Francis Bugler Ltd, Marston Magna, Somerset and Beaminster, Dorset

James de Havilland

Hydraulic drive to internal agitation system. Note mount system designed to accommodate the vibration of the system in work. Good option when spreading slurry from sand bedding systems.

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Clean machines not only create a good impression, but they also make inspections that bit easier. And if a repair is required, the mechanic will be a lot happier, too. Photos: Stefan Tovornik.

Cleaning machinery:

Sparkling clean

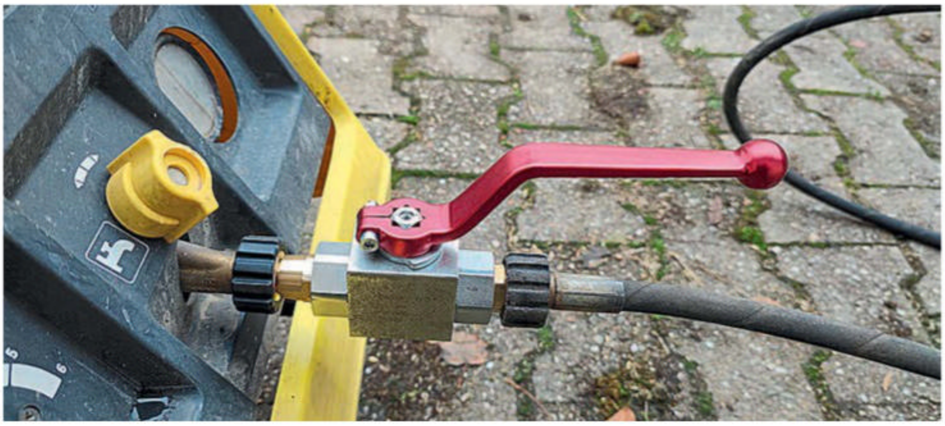
Cleaning off mucky machines doesn't have to be a chore, especially if it's easy to do. Profi readers have sent us in some top tips ... to bring a little joy to the job.

A pressure washer is an indispensable tool around barns, the farmyard and especially when it comes to cleaning equipment. So, it's no wonder that resourceful farmers have made their pressure washers even more practical by adding some clever modifications.

And it's not just the washer itself that's been the focus of our farm modifiers; the washdown area also has potential for improvement – for machines, people and accessories. Whether permanently in place compressed air hoses or an insulated hut for the pressure washer, the ideas are diverse. Here we show you a range of improvements to help you with your spring cleaning or how to avoid freeze damage from a late frost. Hopefully you find some inspiration among them.

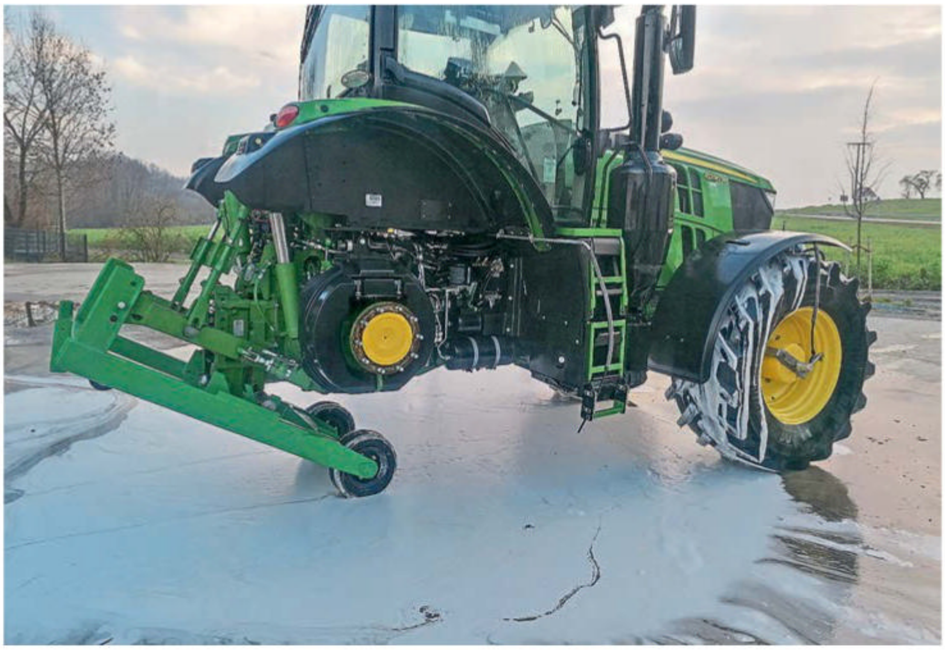
Alexander Bertling

REPLACE THE GUN AND STAY DRY



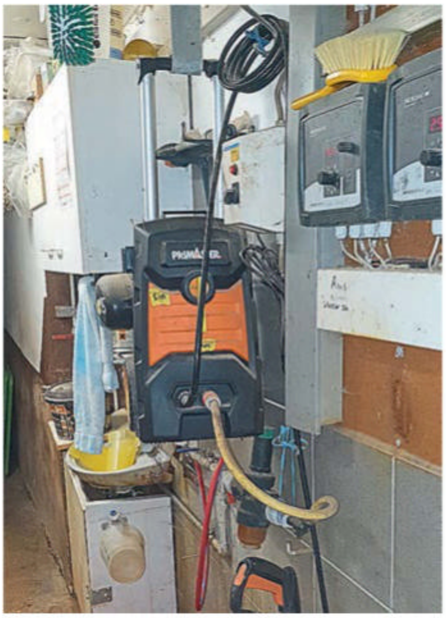
This profi reader found it annoying having to turn off the pressure washer and water feed before he could swap over guns. So, he fitted an adapter comprising a ½in screw-in nipple, a hand screw connection and a ball valve between the hose and the pressure cleaner. The extra parts cost €37 and save him having to stop and restart the steam cleaner.

TRACTOR WASH STAND



Using a similar design principle to the familiar TrakJak, two readers decided to build their own version – the tractor's lift arms lift the jack, keeping the back axle off the floor. After removing the rear wheels, the four-wheel-drive tractor can travel on the two small wheels. As always, extreme caution is required when copying a patented design … for so many reasons.

FROM THE CEILING



This reader bought a small pressure washer to clean the milk bowls used to feed the farm's piglets. It hangs on a home-made hook from the ceiling. The lance and the set of nozzles are stored on a bracket on the wall where he also installed the master switch for easy access.

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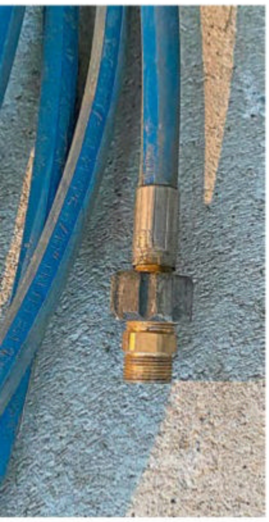
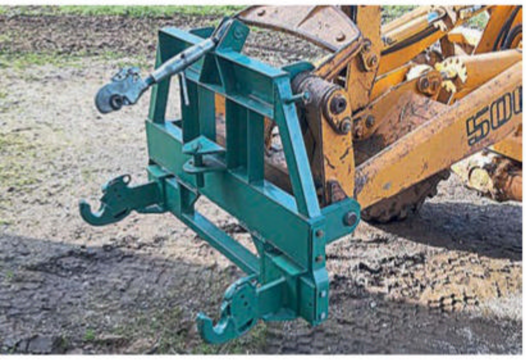
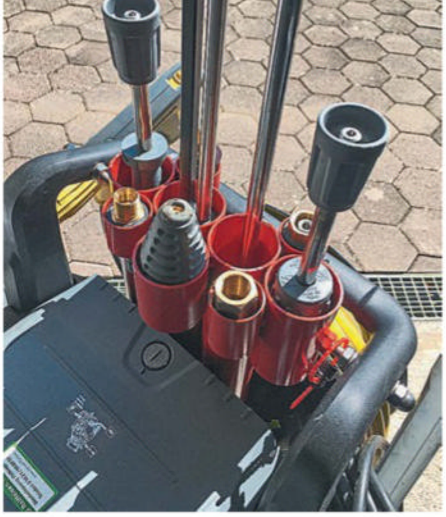


With two 20m extension hoses for the pressure washer, this reader can cover long distances for machine washing. He used two-layer DN08 hot water pressure hoses, which he fitted with threaded couplings. Here the gun can be attached with a threaded fitting.

THREE-POINT ADAPTER

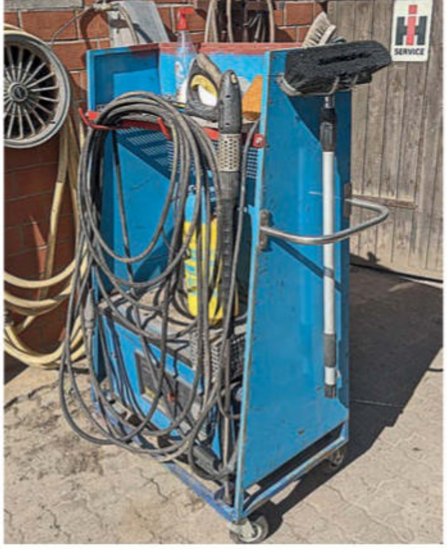


This reader was looking for a solution to make it easier to clean a front mower, for example. So he built a three-point linkage adapter for the carriage of his wheeled loader.



HOLDER ON THE WASHER

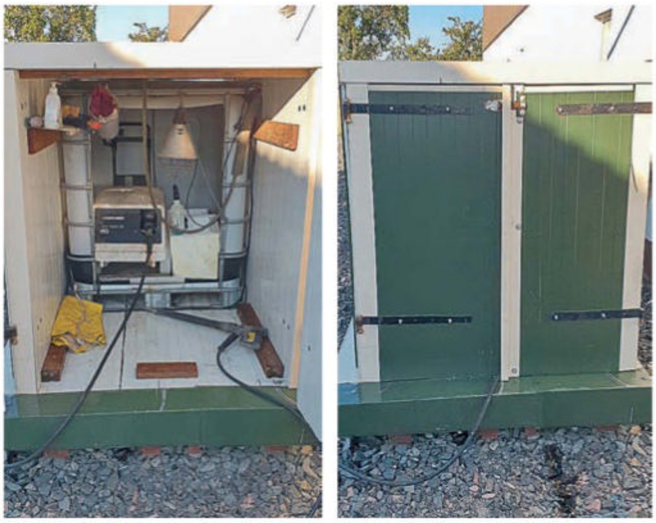
This pressure washer was given several holders, created by welding eight pipe ends of different lengths into a group and placing them in narrow bands ... again, welding them together. The holder bank is attached to the holder of the cleaner by means of welded threaded rods.



CHASSIS RETROFITTED

This Alto pressure washer used to be a stationary unit. To make it a bit easier to move, its owner built a trolley for the cleaner including various storage points for the accessories and other cleaning tools.

HUT FOR FROST PROTECTION

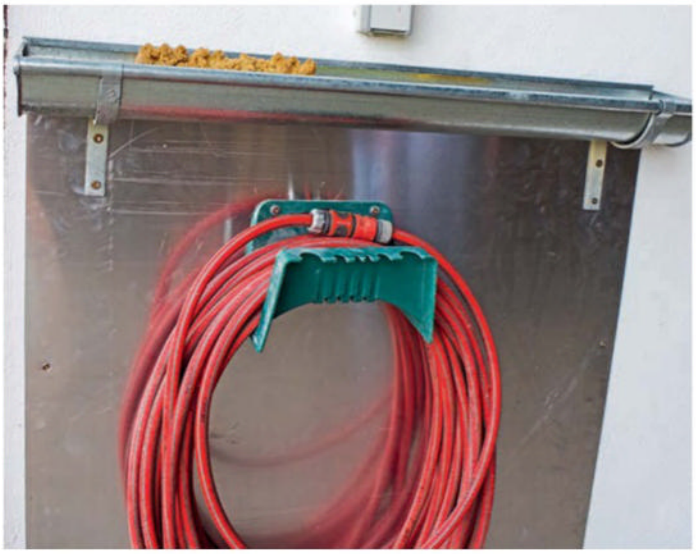


This pressure washer is kept at the wash bay all year round. To protect it from the cold, a hut was constructed out of insulated metal sheet. A heat lamp helps to keep the frost at bay, too, and the hut also stores brushes, an apron and other utensils.

LADDERS FOR WASHERS

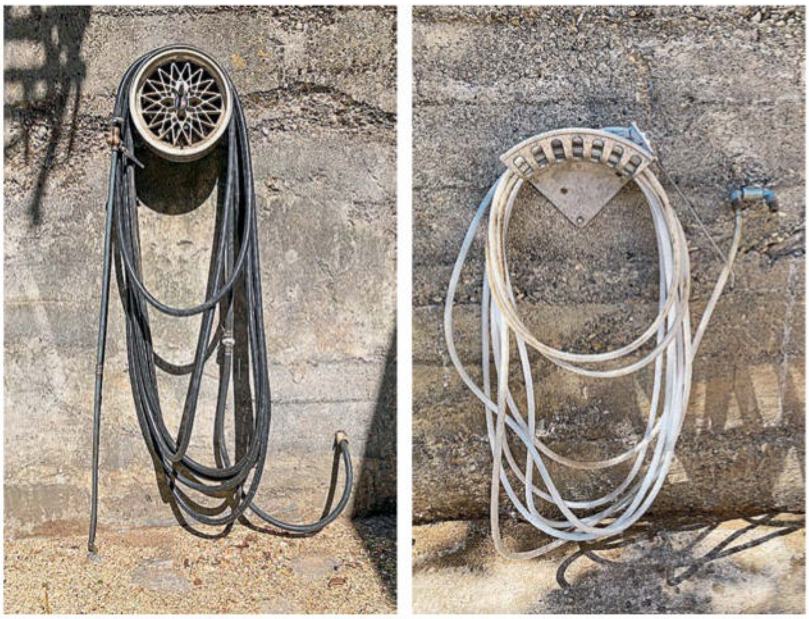
A mobile ladder scaffold gives this reader the ability to clean his machines from all sides. The pedestal is built to a height of 1.80m and rolls on castor wheels. He bought the scaffold for around €200.

GUTTER TURNS INTO HOLDER



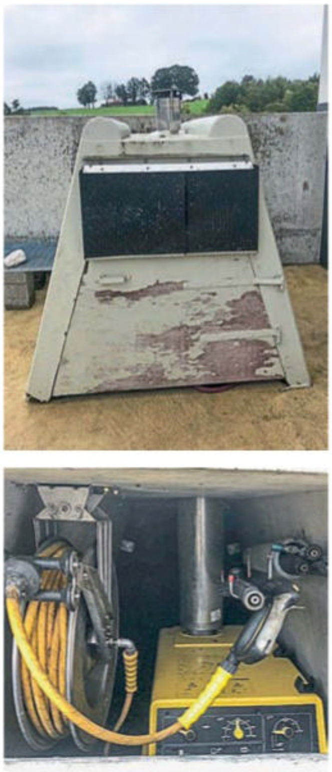
This clever tip mounts the end of a galvanised gutter above the water hose holder to store utensils such as nozzles or sponges. Behind the hose holder, a stainless steel plate protects the wall from a battering and a splattering.

AIR AT THE WASH BAY



This reader installed two air hoses (¾in and 1½in) in the washing bay. The small hose is coupled with an air gun and takes care of jobs that require less air power for cleaning such as when blowing out the radiator, air filter or cab. The larger airline is needed for blasting off dust, dirt and chaff from entire machines such as balers or combine harvesters. In addition to good accessibility, another advantage of having an air hose in the washing bay is that you can easily sweep the debris off the concrete floor.

COTTAGE MADE FROM CLAMP PARTS



This reader built a shelter for his hot-water pressure cleaner. H-shaped walling from a clamp was used as the structure, while the chimney of the hot-water cleaner sticks out through a cored hole in the ceiling. Further holders inside the house accommodate the gun, which has an auto-retract reel.

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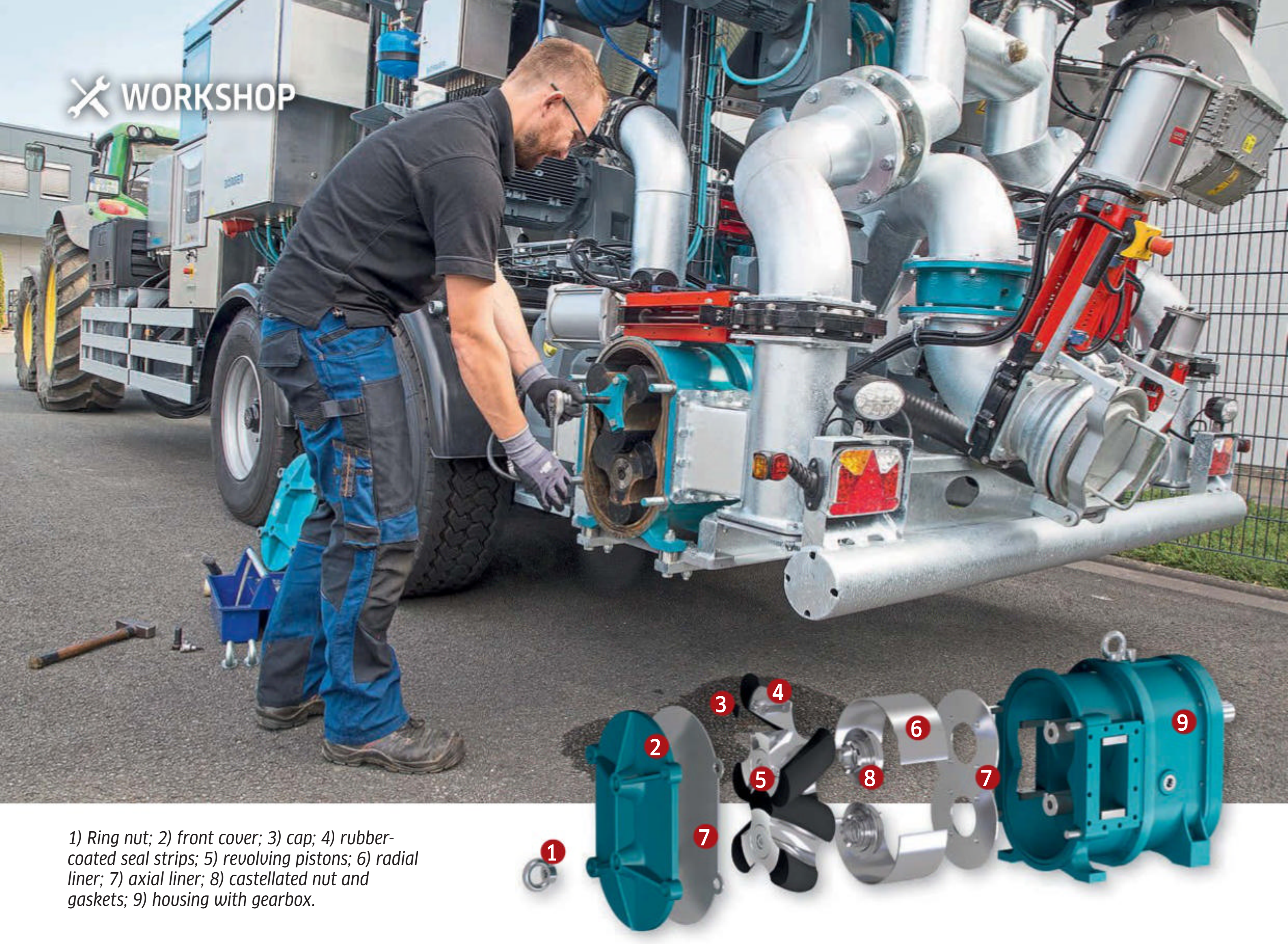


1) Ring nut; 2) front cover; 3) cap; 4) rubber-coated seal strips; 5) revolving pistons; 6) radial liner; 7) axial liner; 8) castellated nut and gaskets; 9) housing with gearbox.

Overhauling a Börger rotary lobe pump:

Fresh rubber

A rotary lobe pump is a bit of an exotic find in the UK and Ireland, only tending to be used for more specialist applications due to a preference for vacuum. Our German counterparts, however, like to do things differently. This is their two-fold 'lobe' article: it explains how the pumps work and, secondly, how to fix them when they go wrong.

Rotary lobe pumps are made by a number of firms and can be found in various types of slurry handling kit. The so-called Blueline models from Börger are just one example and come in 25 different sizes with outputs of 1 to 1,450m³/hr. The maximum pump pressure of the smaller pumps is 16 bar. The larger the pump, the lower this stat is, with the largest models having a maximum of 6 bar. For agricultural use, pressures of more than 3 bar are rarely reached.

Straightforward design

The pumps' actual design is relatively simple: two intermeshing, rotating pistons feed the liquid through the spaces between them and around the outside of the housing to the outlet. Each piston has two or three lobes that can be straight or slightly twisted. The latter produce less pulsation at high speeds, whereas the pumps with straight lobes are somewhat easier to overhaul.

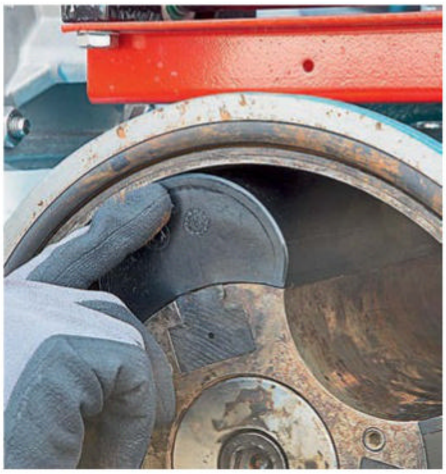
Depending on what the pump is being used for, the pump pistons are either completely

KEEPING IT BRIEF

Change the oil annually if the pump is in permanent operation.

If a seal is defective, you'll be able to see overflow from the oil-filled intermediate chamber.

Pto-driven pumps have two gear stubs, left and right rotation.



rubber-coated with replaceable wear strips or made out of stainless steel (though these latter ones tend to be used in more specialist applications in the chemical industry). An intriguing feature of the Börger pumps is the important fact that only one end of the shaft is mounted in a bearing, but more on this design later.

Detecting signs of wear

Let's first look at possible signs of wear. Usually, the first sign of wear is a drop in overall pump performance caused by wear on the rotary pistons or the sealing strips. This creates a gap in the housing, resulting in a loss of pressure. The trait is especially noticeable when pumping thin slurry when the gap is about 2-3mm. A unit that's used to handle thick cattle slurry will generally tolerate more wear on the sealing strips as fibres in the manure provide additional sealing.

In addition to natural wear, foreign bodies in the slurry are, unsurprisingly, not at all good for pump longevity. Depending on the type of system, the pump is protected with either a shear pin or a slip clutch on the pto shaft or via the hydraulic or electric motor.

Nevertheless, scoring and chip marks may well be found on the sealing strips. Börger uses a stone trap to collect large and heavy foreign objects such as stones, which sink to the bottom during suction. So, hopefully, if all is working as it should, these objects should not get near the pump.

Easy maintenance and prices

With only one end of the shafts on the Blueline pump mounted in bearings, these pumps are pretty easy to strip down and fix. You don't need to remove the outlet and inlet flanges on the sides, and the pump can remain in its position – as in our

USER TIP

DON'T RUN IT DRY

A worn lobe pump won't manage to suck up slurry from a deep pit and through a long hose directly after start-up. The result is it runs dry and, in the worst case scenario, causes the unit to overheat. Bernhard and Lukas Bronnert, from Gescher in Münsterland, who milk 110 cows on their farm, also had to struggle with this problem.

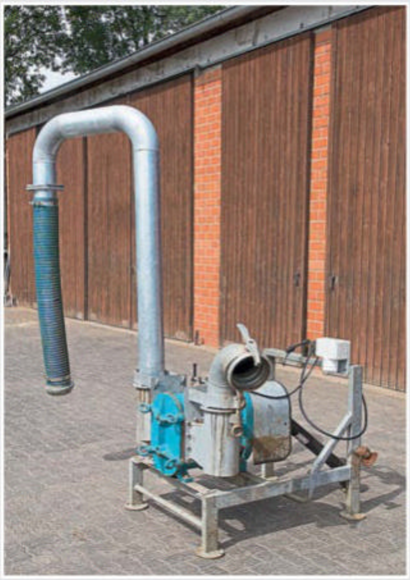
"We pump slurry from the shed's pit and through a 100m underground pipe into the slurry lagoon with our Börger FL776 rotary lobe pump," explains Bernhard. "Occasionally we ended up with the pump running dry. If we didn't notice it in good time, the sealing strips and the pump housing would go because of overheating."

Since a new set of sealing strips for Bronnert's pump costs around €600 and, in addition, the housing – which doesn't yet have a replaceable liner – had to be replaced, the enterprising farmers came up with a safety system to increase pump reliability. The temperature of the pump housing is now recorded by a bimetal sensor, which is connected to a horn with the use of simple electronics. "When the temperature of the housing reaches 30°C the alarm sounds," says Lukas. The system is supplied with power via the tractor's three-pin socket. In addition, the farmers installed an impeller to the inlet of the lagoon that shows material flow by means of a rotating pointer.

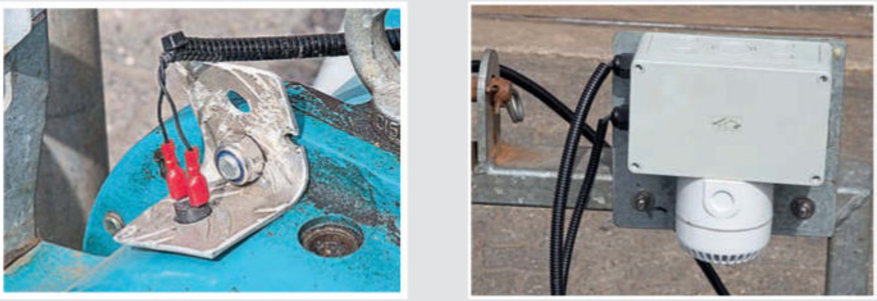
To improve suction performance, the farmers designed a suction arm. This was fabricated from 150mm pipe and is 1.80m high. This ensures that the lobes are always immersed in liquid; at the same time, it increases the suction effect. If the suction pipe is empty, it can be filled in advance so it is primed and ready to go.

"Since we installed the new suction arm, we no longer have problems with a pump running dry," Bernhard tells us. In total, the modifications cost around €400 and have prevented more expensive repairs on several occasions.

Bernhard Bronnert and his son Lukas modified their rotary lobe pump.



The high suction arm ensures the pump is immersed in liquid when it starts pumping.



A temperature sensor triggers a horn if the housing temperature exceeds 30°C.

example here on a mobile separator (see the main picture on page 54).

Börger calls this 'Maintenance In Place' (MIP), meaning that all of the key components are accessible through the pump's front cover and can be removed and re-fitted through this opening.

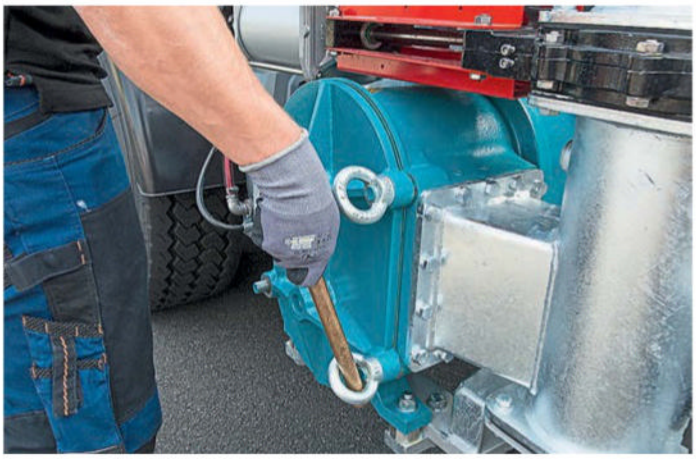
The prices for the wearing parts will depend on the size of the pump and lobes. The unit here is one of the more popular models, the FL776 with a capacity of up to 310m^3/hr. For this pump model, the linear sealing strips cost around £62 each. You'll need a total of six, so this tots up to £372.

The linings for the axial and radial casing cost around £525. So, a complete wearing component overhaul is going to cost around £900 – not too bad for a return to pretty much 'as new' performance.

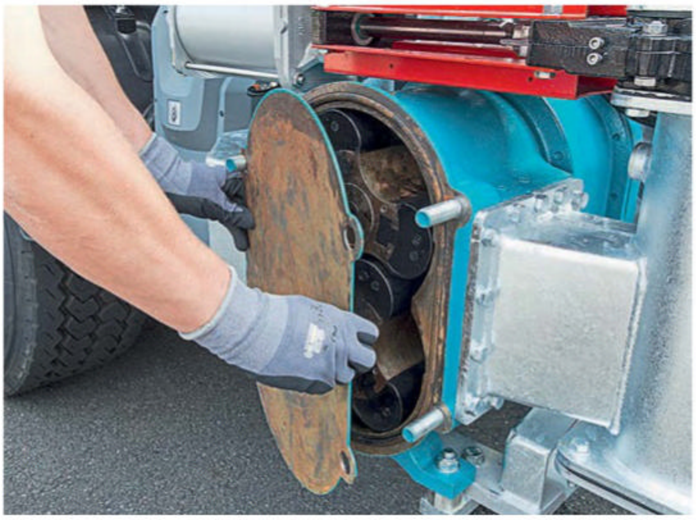
Alexander Bertling

REPAIR PROCEDURE

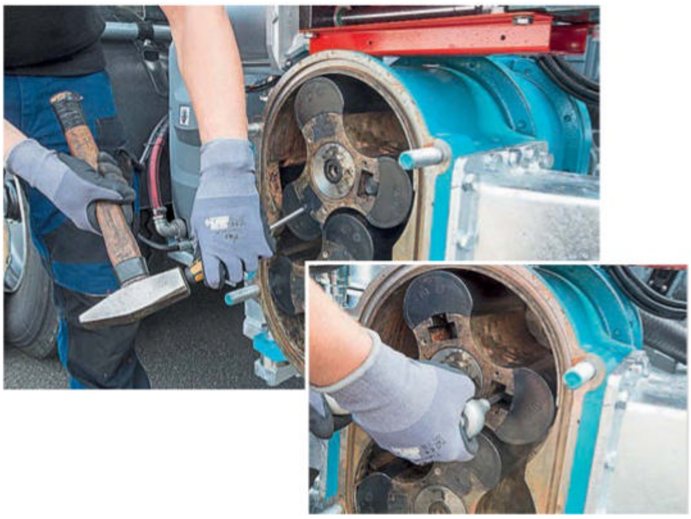
REPLACE THE RADIAL LINING AND SEAL STRIPS



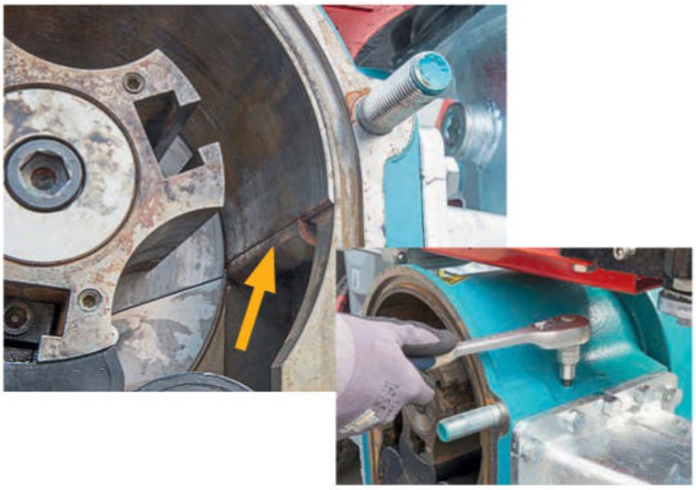
Before you open the pump's front cover, let the pump run dry or get a container to collect the slurry. Then open the four ring nuts on the front cover. If these are stuck, a lever is a useful aid to get them moving. Then remove the front cover of the lobe pump housing.



The following photos show the wear plate (axial housing liner) on the front cover. You can simply remove the plate and put it to one side. Also, remove the sealing ring around the cover and inspect it for cracks. Don't forget to reinstall it later.

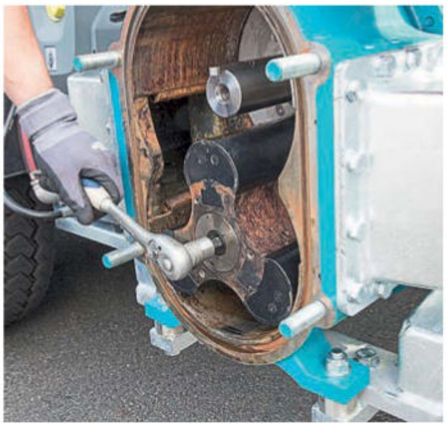


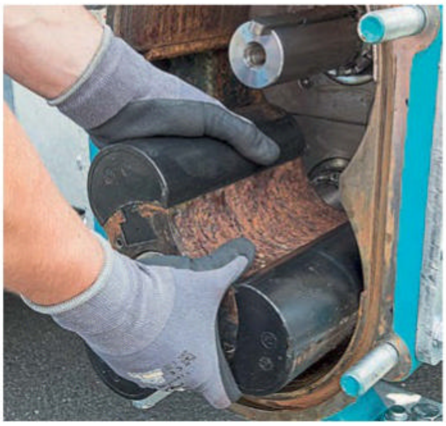
To replace the sealing strip, take a screwdriver and prise off the caps of the nuts, pull out the plastic spacer and loosen the Allen screws. Turn the corresponding sealing strip into the interior of the housing and then pull out the strip.



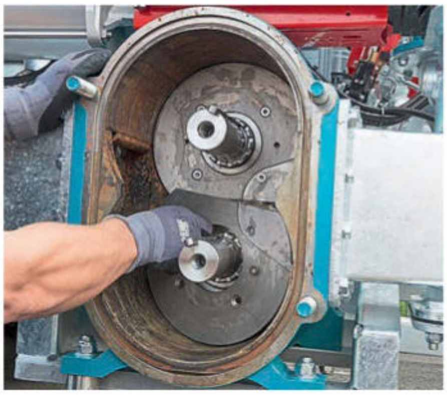
Wear on the linings is recognised by grooves and marks. Depending on the liquid that's pumped, the shells can outlast three to five seal strips. The clamping mechanism is loosened by undoing the external Allen head screws. You can then pull out the linings. On pumps that have clocked many hours, it may be necessary to replace the clamping rails, too. Here you should make sure that the lugs (arrow) jam the shell in place. Assemble the new parts in reverse order.

REMOVE THE VANES AND REPLACE THE SEALS

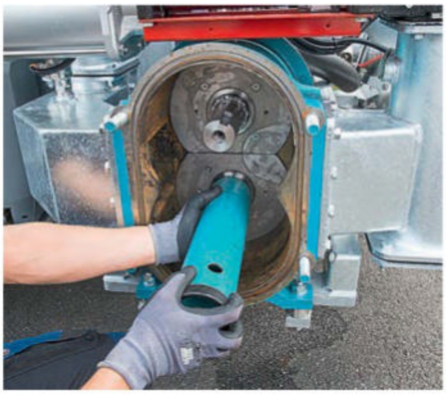




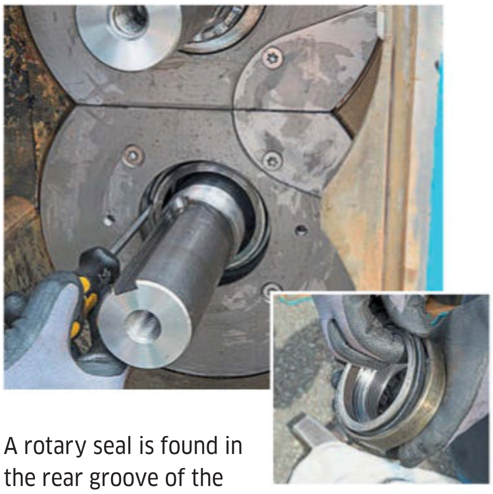
To remove the vane and replace the seals, drain the oil from the intermediate chamber. Then loosen the Allen screws in the middle of each vane. The nuts rest on copper rings, as the shaft stubs are slightly wetted with oil, which is supplied from the intermediate chamber by the rear threading to prevent corrosion. Don't forget to refit these rings when reassembling. They are important and seal the shafts to the chamber. Our tip: Remove the lobes, Börger offering a puller that is bolted into the lobe (shown in the main photo on page 54).



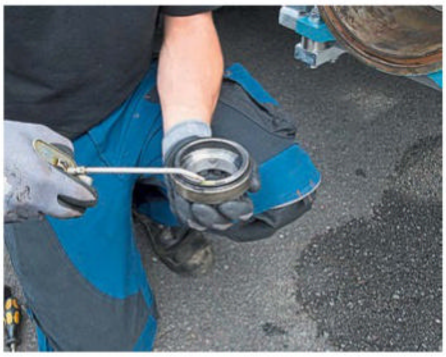
To change the axial linings, loosen the stainless flat-head bolts. Two threaded holes on each plate allow you to push the plate off the housing. Afterwards you can install the new plates; you don’t need to remove them when replacing the seal.



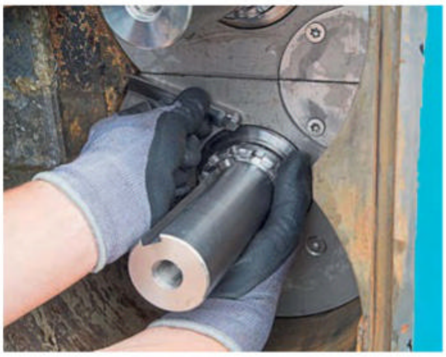
Further on, remove the keys from the shaft splines and loosen the castellated nut. A special tool from Börger is suitable for this job: use the toothed end to remove/attach the castellated nut. Apply the opposite and smooth end to fit the new seals.



A rotary seal is found in the rear groove of the castellated nut. You can remove this. Another seal sits in the shaft gland. You'll have to prise this seal out with a screwdriver.



Clean the seats of the seals and their contact faces thoroughly using a cloth. Apply a few drops of oil, and then fit the new rotary seals. If you don't have the special tool for pushing in the rear sealing ring, find a suitable plastic sleeve or nut with which you can push the seal in straight and over the entire surface.



Refit the castellated nut back in until its top face is flush with the wear plate. You can use the key as a gauge. If all surfaces are flush, loosen the castellated nut by one tooth and insert the key using the ring lock of the nut. This sets the axial position of the lobe centrally inside the housing.

After fitting and attaching the lobes and closing the pump housing, oil must be filled into the intermediate chamber. In this case, 3.8 litres are required. Replacing the wear strips takes about one hour with a little practice, and this includes replacing the seals. If you're only replacing the sealing strips, this can be done in about 30mins.

N D Harper, Cheshire:

Slot or dribble

While chatting to Vogelsang UK for our practical test of the UniSpread trailing shoe on page 22, the firm mentioned that Cheshire contractor N D Harper is operating both shoe and dribble bar versions. So, we sat down with Harper's contracting manager, Jamie Taylor, to get his opinion on where the two systems work best.

The firm runs a 12m SwingUp applicator, which incorporates a bigger heavier frame for wider working widths. The SwingUp folds down the flanks of the tanker, rather than across the rear as with the UniSpread. This 12m outfit is particularly suited to working in a 24m tramline system.

The dribble bar version of the UniSpread is the preferred option for using with the umbilical system, as it makes it easier to cross the pipe. Currently most customers are happy with dribble bar performance.

Cheshire-based N D Harper operates both a 10.5m UniSpread dribble bar on an umbilical system and a 10.5m trailing shoe version on a HiSpec 4000 (18m³) tanker, while its slightly older tanker counterpart has a 12m SwingUp shoe applicator. It's fair to say the contracting and farming business has something of a penchant for Vogelsang applicators, so its contracting manager, Jamie Taylor, is well placed to speak about the merits of the various systems.

The UniSpread dribble bar on the umbilical system replaced an older Spread Wise unit, which had done its time when the decision was taken to replace it with Vogelsang's latest offering. The dribble bar is supplied with slurry from a Doda HD 35 pump, working through 5in and 4in hose directly from slurry lagoons and stores.

"We can hire in a nurse tank, but I feel that if we're bringing the slurry that far in a tanker, we may as well bring it into the field, too," says Jamie. "These tankers float well on the big tyres (750/60 R30.5), despite their size, and both tankers have a trailing shoe, so it's just more efficient to do it that way."

The dribble bar is now in its second season, and Jamie has been particularly impressed with the ECQ macerator. Most of the stock in the firm's patch are fed with precision chop silage rather than bales, although there are a few forage wagons in the area as well. Jamie points out that most of the slurry will have been blown into a lagoon, and there is a chopper on the umbilical pump. So, by the time the liquid reaches the macerator, any foreign objects should have been chopped. They've only been stopped once by a piece of plastic. "Our biggest issue is sand used for cubicle bedding; it just wears everything

Jamie Taylor, contracting manager at N D Harper, operates both a trailing shoe and dribble bar version of the Vogelsang UniSpread.

Big tyres on the tanker give an impressive amount of flotation for a rig that is budging 18 tonnes. They minimise the risk of soil structure damage.

out," says the operator, adding that they did have some problems with the previous ECL, but then it was pretty much worn out.

The 2019 HiSpec tanker has a 12m Vogelsang SwingUp trailing shoe that folds along the flanks of the tank. "The wider working width was bought to work with 24m tramlines, so we travel on the tramlines on every second run," explains Jamie. "It works well, but the tanker doesn't seem to mark the ground, so I don't think it is a problem to not use the tramlines."

When the second 18m³ tank arrived in the yard near Holmes Chapel, the decision was made to equip it with a 10.5m trailing shoe UniSpread. "It folds up so neatly behind the tanker compared with the other one," says Jamie. "It makes putting the pipe on the hooks a lot easier. The only downside is that, to clean the tank out, you have to take off the trailing shoe. But that's only a five-minute job. This new tanker has a manhole on the side, so we used that the last time."

Both of the tankers are fitted with 8in self-fill arms complete with HiSpec's own turbo filler. "Once you have the pod set up, you can really shift some muck," explains Jamie. "The first tank has two 6in valves if we need them, but the second has just the one 8in. You'd want to be He-man to handle that pipe, especially if it's in a lagoon with a load of slurry in it." Given this challenge, it's always preferable to use the self-fill arm.

Proof of this efficiency was further reinforced when working alongside a hired-in 13.5m³ (3,000 gallon) tanker, which had a manually attached 6in pipe. "By the time you got off the tractor, attached the pipe and turned on the pto, filled the tank, turned off the pto and had taken off the pto, we were in and gone with the 4,000 gallon. Over the course of a day, that's another three or four loads.

"We are reasonably flat around here apart from some fields with butts and reans (ridge and furrow), but the springs on the trailing shoe are still able to flex enough to stay in contact with the ground just as well as the Swing Up, which can pivot in the middle like a sprayer boom," he explains. "We do have the option of using the 10.5m trailing shoe on the umbilical and the dribble bar on the tanker, but we just lift the shoe up a little bit if we need to dribble it on. Around 95% of the pipe work is with the dribble bar; it's a tidy job and simpler for crossing pipes, and there's no wear to it. The macerator is pretty much the only bit that will wear."

Both UniSpread versions have a pipe going to the rear for a splash plate if it is needed, such as when dealing with really thick slurry at the bottom of a tank that may contain sawdust, paper or sand that was used to bed up cubicles.

On the subject of making the most of slurry, Jamie says that they are looking at adding an NIRS unit to the dribble bar, as they are currently doing a lot of soil sampling and also want to use the sensing technology on the two Krone foragers when yield mapping. The challenge for now is getting the Big Xs to work with a John Deere HarvestLab. "We did have some slurry with around 50 units of nitrogen. That's when you need to know what you are putting on, so you can make savings with fertiliser."

Mervyn Bailey

A trio of four wheelers:

Four wheels on a roll

Last year both Oxbo and Vervaet unveiled four-wheel self-propelleds, while this type of machine was always muted to be on the cards for Oxbo, it was something of a surprise from Vervaet who have been obstinate of the virtues of its trike layout. Given the vast cost of these machines, they are certainly not something you would buy on a whim, we tracked down early users of the snappily named AT5104 LNMS and the 'Quad' as well as a more familiar player in the four-wheel self-propelled field, Vredo with its VT4556 SlurryTrac which has also had a relatively recent makeover. First up is the Oxbo.

With roughly 100 machines on the books and a fulltime staff of 17, Schoemaker Landtechnik is one of the largest contractor's in the Lower Saxony region in north-west Germany. Located just a couple of miles from the Dutch border, main activities include slurry application, grass and maize silage, combine harvesting, straw baling, and potato harvesting (see machine fleet).

Operating within a 25-30km radius of Itterbeck village, although they are occasionally asked to pop across the border, most of their customers are German farms. The country's slurry spreading season runs from the beginning of February to the start of November. The volume of slurry work depends on the season. Spilt 50:50 between grassland and maize (pre- and post-drilling), it is all applied by three machines. The AT5104 LNMS (Liquid Nutrient Management System) and a pair of 20m³ Wienhoff trailed tankers with 15m Bomech Trac-Pack trailing shoe applicators.

Self-propelled experience

New AT machines now leave the Dutch assembly line at Roosendaal with Oxbo branding, and Schoemaker's machine, one of the last to wear the Ploeger name, is the contractor's third self-propelled. The previous two were both Vredo Trac's. The first, a used 4,000-hour four-wheeled VT3936 arrived in 2014. The German contractor put a similar number of hours on its clock before swapping it for a new VT4556 in 2018.

Part-exchanged after 5,000 hours for the 22m³ AT5104 LMNS which arrived at the beginning of April last year. We covered the technical details of the Dutch manufacturer's first four-wheeler in our March 2022 issue. To briefly recap, it shares the same suspended Claas cab as the three-wheeled AT4103 and five-wheeled AT5015. Powered by an identical 550hp Scania block as five-wheeler, the AT5104 also uses the same mechanically powered and steerable Kessler axles as the AT5015. The main difference is that they are spaced further apart on the four-wheeler's in-house developed crab-steering chassis.

And this brings us to the main reason for the contractor's decision to change brand. Which was driven by the AT5104's fully mechanical box. This is mated to the next generation ZF Eccom 5.5 CVT. The dimensions are the same as the Eccom 5.0 used in the AT5105, but the stronger box is designed to take more power. The contractor's self-propelled spends a lot of its time on heavy ploughed land in the spring ahead of the maize drill, and it is here that the AT5104's mechanical box comes into its own when software automatically optimises the engine speed and drivetrain. "The hydrostatic transmission on the previous

The combination of centrifugal and lobe pumps results in quick filling times of the 22m^3 tank. The joystick operated 8" loading arm can load between 2.75m deep and 4.5m high.

The AT5104 is the German contractor's third self-propelled slurry application machine. Vredo was the brand of the previous two.

machine was always stretched to the limit," says AT5104 pilot Lars Eggengoor, who reckons that the stronger mechanical box on his new mount provides more pulling force. "Three is not a lot of difference between the two transmissions on grassland, but on ploughed land it allows me to drive much faster, providing stepless field speed changes up to 30km/hr, with no gear changing."

Slurry in post-drilled maize

The German contractor's AT5104 can be coupled to four different applicators. Three of these were previously used behind the Vredo machines; a 9.0m Vredo grassland injector, 6.0m Evers Toric arable land disc cultivator incorporator and a 6.0m (eight-row) Volmer Strip Till for maize.

When we visited it was coupled to the 18m Bomech Trac-Pack trailing shoe. Bought new for the AT5104, the hose spacing of the 72 outlets of 25cm is ideal for applying slurry into maize, and being able to work on tramlines is another reason why the contractor favours a four-wheeled self-propelled. It is something they did for the past three seasons with the Vredo, but with a 15m wide Bomech Trac-Pack trailing shoe.

German farmer interest in adding slurry to maize crops is increasing. In some areas of the country you are not allowed to apply slurry to land after cereal crops have been harvested. Applying slurry to maize crops (depends on the season but usually in June) ensures that livestock farms have sufficient slurry storage capacity to cover the winter months. Expensive artificial fertiliser costs are also driving the increased use of slurry in maize.

Last season, the AT5104 injected some 6,000-cubes into maize (this can be done until the crop reaches knee height), when the standard Mitas 1000/65 R32 boots are swapped for Trelleborg VF480/80 R50 duals. The 2.15m tall row crop tyres increase the

Operator Lars Eggengoor is well pleased with his latest mount, which he describes as powerful and comfortable.

Bought new at the same time as the AT5104, the Bomech Trac-Pack trailing shoe applicator has a working width of 18m.

DATA SHEET

Oxbo AT5104

ENGINE

13.0-litre, six-cyl Scania DC09, maximum engine power 550hp at 1,780rpm (ECE R120), 2,450Nm torque at 1,400rpm, Stage V emissions with SCR and DOC. Fuel tank 850 litres, AdBlue 60 litres.

TRANSMISSION

ZF Eccom 5.5 CVT. Mechanically driven, all-wheel drive. 30km/hr max. in the field. 40km/hr max on the road. Standard tyres Mitas 1000/65 R32 tyres. Optional 900, 1000, 1050 and 1250.

SLURRY SYSTEM

22.0m^3 polyester tank. 9.0m^3 capacity Börger slurry pump (12.0m^3 option), Vogelsang macerator, 14m^3 centrifugal loading pump with bypass system.

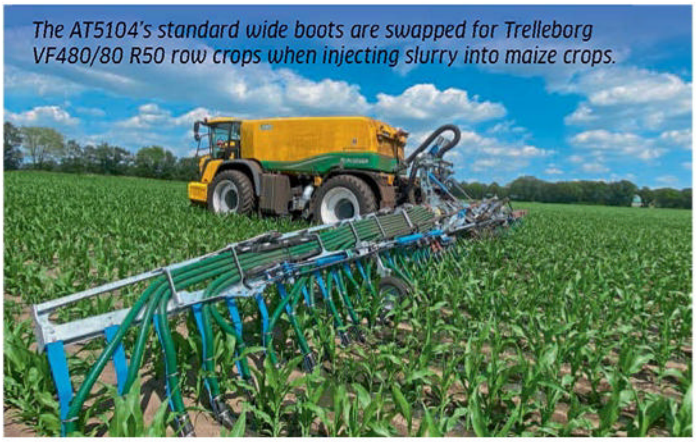
Dimensions and weights

23.5t empty weight, 3.9m height, 3.0m width, length 10.5m, 4.8m wheelbase. Rear linkage lift capacity 10t.

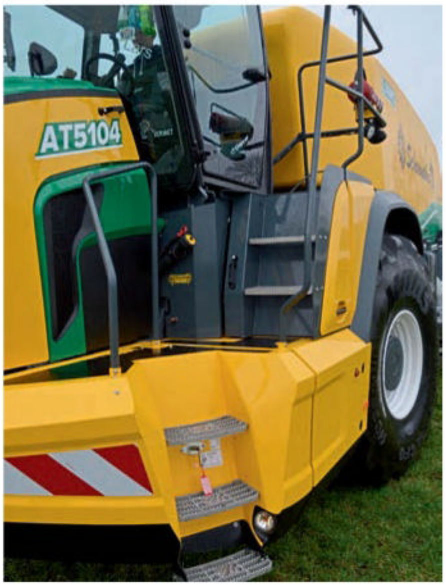
Manufacturer information

OXBO

THE Dutch manufacturer's three-model range of AT LNMS machines began with the three-wheeled 400hp Scania-powered AT4103 (16.0m^3), which was launched at Agritechnica 2017. The five-wheeled AT5105 (26m^3) was in the field for testing the next summer, and early 2021 the company revealed details of the AT5104 (22m^3). We saw the prototype in action towards the end of that year. The three pre-production machines made last year all work in Germany. Another 10 machines were built at the Dutch facility in Roosendaal for this season. Ploeger Oxbo area sales manager Stefan Wisselink, says that the company is keen to grow the numbers, but stresses the importance of starting slowly to ensure they get it right. "We only have one opportunity to do this," he comments. "Germany is the first market, and we are currently in the homologation process for France. If there is interest from the UK then we will do our best to ship one across."


The AT5104's standard wide boots are swapped for Trelleborg VF480/80 R50 row crops when injecting slurry into maize crops.

AT5104 operator Lars Eggengoor (right), with Ploeger Oxbo area sales manager Stefan Wisselink.


The cab on the production model is easier to access than the prototype. This is due to the wider access steps and handrails.

The capacity of the polyester tank is 22m³ and the four Mitas tyres are all of the size 1000/65 R32.

The 3.1t slurry kit increases the 23.5t empty weight of the AT5104 to 25.6t; well below the maximum road legal weight of the vehicle of 30t.

BUSINESS FACTS

Shoemaker Machine Fleet

Tractors	Fendt (939, 936, 3 x 930, 922, 2 x 828, 612 and 412). Massey Ferguson (2 x 7718, 7719), Deutz-Fahr 6215, JCB Fastrac 4220, Case IH (Optum 250, 2 x CVX 195), New Holland TM165, MB Trac 1500 and 1600, and 4 x Mercedes Benz Unimogs.
Self-propelled forage harvesters	Krone Big X (650 and 3 x 780), Claas Jaguar (860 and 990).
Self-propelled mowers	Krone Big M 420 and 450.
Combines	Claas (Lexion Terra Trac 750, 3 x 770), Tucano 540 and a New Holland CS540.
Other main kit	Claas (Lexion Terra Trac 750, 3 x 770, Tucano 540) and a New Holland CS540.

width of the machine from 3.0m on the standard rubber to 3.1m.

The 22m³ tank capacity is three cubes more than the 19m³ VT4556, and the Bomech applicator is 3.0m wider, so it will come of no surprise to learn that the capacity of the contractor's new self-propelled is higher than their previous machine. However, there are a few other factors that help to increase capacity. These include the AT5104's centrifugal pump with by-pass system, which depending on the slurry, fills the tank at 12-14m³/min. The driver is pleased with the 850-litre capacity of the fuel tank, which he reckons lasts for two days.

He stresses that there are only a couple of days a season when this is possible, but with a good supply of slurry, short travel distances, and the right fields, he can hit a peak output of 1,800m³/day. On the best day with the Vredo he handled 1,400m³.

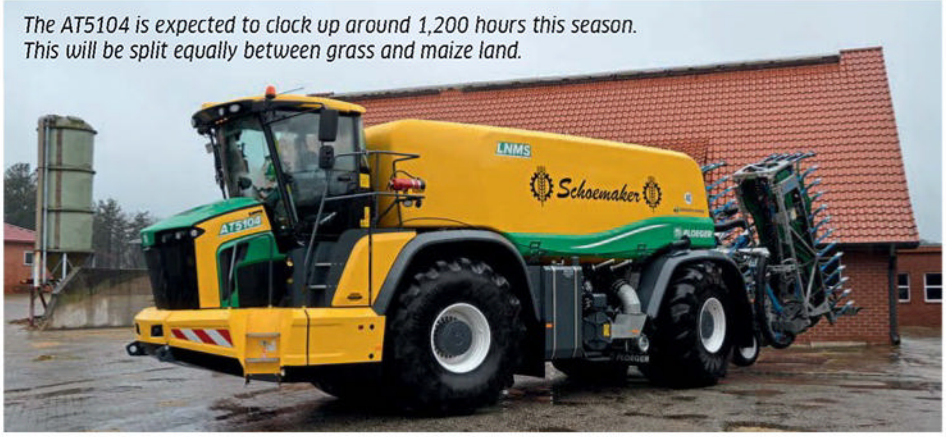
Operator view

The AT5104 arrived two months into last year's slurry season, and at the time of our March visit its clock had just passed 800 hours, although in this second season it will clock up around 1,200 hours.

Aged 23, Lars is quite possibly one of the youngest self-propelled slurry machine operators. Previously, he sat on a Fendt 930 for four years for a neighbouring contractor, with mainly on transport work (silage and groundworks) and arable land preparation.

Mr Schoemaker's son did his work experience at the same contractor, and it was not long before Lars was invited to visit the company. Keen to spend more time with farm contracting duties, the opportunity arose when Shoemaker's Vredo operator left. It did not take Lars long to take the decision to swap the tractor cab for that of the self-propelled slurry machine. He has never looked back since, and following two seasons on the

The contractor's Ploeger dealer is also a Case IH, Pottinger, Schuitemaker and JCB dealer. This special edition 4220 is one of only 25 produced to celebrate the 25th anniversary of the Fastrac.



The AT5104 is expected to clock up around 1,200 hours this season. This will be split equally between grass and maize land.

Vredo, he is the sole operator of the AT5104. He confirms that his new mount is very comfortable both on the road and in the field. This is due to the combination of the hydraulic front axle suspension system and the air/hydraulic suspended cab. “The control layout is also good and there are not many buttons to push,” he adds.

The German contractor has no hard and fast rule when it comes to machine replacement. With 12,000 hours on its clock, one of the firm’s two Case IH CVX195’s was in the workshop for a makeover at the time of our visit. However, the tractor with the highest number of hours on its clock (19,500) is the 15 year-old Fendt 922.

It is crucial that self-propelled keeps running during the busy season, which is why most contractors, including Schoemaker, tend to part-exchange these machines after 5,000 hours. The German contractor is now keen to clock up this number of trouble-free hours with the AT5104.

Steven Vale

The contractor’s fleet of slurry vehicles includes a Scania 520 (30m^3) lorry. Trailed tankers include 2 x Janskie (30m^3), a 21m^3 triple-axle Annaburger, and two triple-axle HTBs (25m^3). The Fendt 922 has clocked up an impressive 19,500 hours.

Schoemaker has two trailed Wienhoff 20m^3 capacity tankers. Boto are coupled to 15m Bomech trailing shoe applicators.

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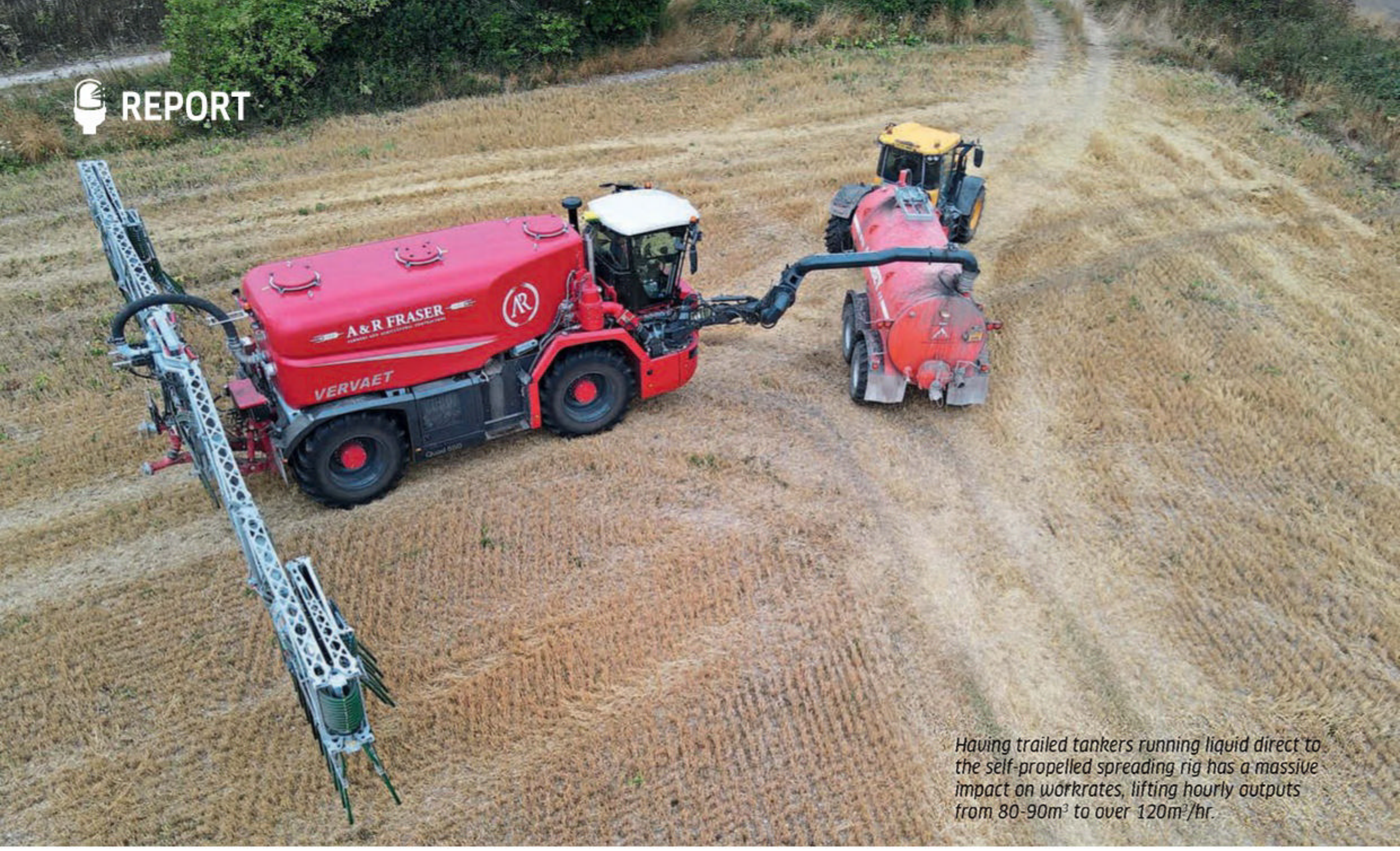


Having trailed tankers running liquid direct to the self-propelled spreading rig has a massive impact on workrates, lifting hourly outputs from 80-90m^3 to over 120m^3/hr.

A trio of four wheelers:

Vervaet Quad 550

It's over a year since the Fraser family took delivery of their Vervaet Quad 550 with its 22m^3 tank and 32m Vogelsang dribble-bar and in its short life it's clocked some 900 hours. Developed for users where running down crops with three or five tyres is considered bad form – the four-wheeled Quad that joined the Dorset operation's fleet was one of the first machines to come off the production line.

"Having made the decision in the back end of 2021 to go with Vervaet we had a bit of a wait for our own machine and so they sent us their prototype," explains Jonny Fraser. "We ran it from January to late April last year and it gave us a good opportunity to see how the product developed over that time, knowing our Quad would have all the updates and tweaks from new. The thing it really proved was that we had made the right decision to up our capacity."

Life before Quad

Previously the business had been running a 2013-plate Claas Xerion Trac VC with 16m^3 SGT tank and 24m Vogelsang dribble-bar. It had come into play as demand had grown for precision applications of slurry and liquid digestate to growing crops.

"Five years ago we were running trailed tankers and serving predominantly livestock customers who viewed their slurry as a waste product. With more digestate becoming available the whole emphasis changed with arable growers wanting it applied as a fertiliser alternative to crops in the ground," recalls the contractor. "The Xerion was a big step up from the tankers and proved that the self-propelled concept could really work in upping our daily outputs – we were averaging 45-55m^3 an hour."

While the Claas/SGT setup helped in pushing workrates and matched demand for a few years, by mid-2021 it had become apparent that a further increase in output was required to match the increasing demand for liquid applications.

"We initially liked the idea of having a tractor that we could pull the slurry kit off and use for other jobs but the reality was that that never happened," explains Jonny. "To get real output you need a dedicated self-propelled machine but it's a huge capital investment and the reality is that it'll be stood up for closed NVZ periods. We considered something with interchangeable liquid and solid spreading bodies but it seemed too much of a compromise."

Jonny Fraser with main Quad operator Timmy Pitts.

Yes to four wheels

Looking at their options, the Frasers knew they had to have a four-wheeled machine to enable them to run up tramlines in growing crops – often they're applying liquid digestate right up to flag-leaf emergence in cereals. That limited their options somewhat.

"For us it came down to a choice between Vredo and Vervaet. We went with Vervaet because although it was a big investment, the projected depreciation was the lowest of

A Valtra T234 and T235 are used to ferry tankers from storage lagoons to the field.

anything we looked at," says the owner. "The high second-hand values are supported by Vervaet's reconditioning programme that means high-houred second-hand machines get a new lease of life. The other big factor was back-up – although the UK importer J Riley is based in Norfolk, we know they've got a team of guys and shelves of parts dedicated to Vervaet's self-propelled spreaders."

So, at the back end of 2021 an order was placed for a Quad 550 equipped with 21m^3 tank and 32m dribble-bar. With delivery not scheduled until the end of April the following year the business was left with a significant gap to fill in its spring spreading window. Vervaet agreed its prototype machine would stay with the Frasers until their own unit arrived – a move that gave them the opportunity to understand how things would be adapted and changed for production-run machines.

"In that time we clocked some 700 hours on the prototype and it was really interesting to see the little things that changed over that time. Because our own Quad was to be one of the first off the line it's still viewed as a development machine and Vervaet will continue to update it."

Delivering the goods

With its 21m^3 tank and 12,000l/minute pump, the self-propelled unit quickly established itself as a hungry beast that needed regular feeding if its appetite was to be satisfied.

"Flow rates through the Xerion's 9,000-litre per minute pump seemed impressive at the time but the step up to the Vervaet was huge," notes Jonny. "What it quickly proved was that we needed to improve the logistics around slurry supply. It's all very well having a high output application rig but if it's not kept fed then it's pointless.

"So, we invested in two of our own artic tractor units and 29m^3 tankers to run on the roads to storage lagoons and now dedicate our tractor-drawn tankers to solely keeping the Vervaet fed, not running up and down the road."

Where possible the Frasers' 15.9m^3 and 18m^3 (3,500 and 4,000gallon) tandem-axle Abbey tankers now travel from satellite lagoons direct to the field, running up tramlines ahead of the self-propelled machine to enable it to unload without coming off track.

"It's all about getting the liquid to the machine as quickly as possible – with that approach we're now able to handle 110-130m^3 an hour whereas before it was more like 80-90m^3. To make the machine pay it needs to be running at those higher work rates so we're focused on getting better organised and are building more storage lagoons at the sites where the product is needed to help shorten the haulage runs."

Busy season

Since it arrived late last April, the business' own Quad 550 has clocked over 900 hours

While the cab structure comes from Claas, Vervaet has added its own details.

BUSINESS FACTS

A & R Fraser

Farmed area	1,630ha
Cropping	Winter wheat 365ha, oilseed rape 245ha, winter beans 400ha, spring barley 365ha remainder down to grass
Stock	120 store cattle
Contracting work	Stubble-to-stubble arable work, round and square baling, liquid digestate and slurry handling and spreading
Machinery Slurry	Vervaet Quad 550 and 1 x Abbey 15.9m^3, 2 x 18m^3, 2 x Scania R450s and 29m^3 vacuum tankers
Tractors	2 x JCB 4220 Fastracs, Valtra T234 and T235, Claas Axion 870
Handling	JCB 542-70 and 536-60 telehandlers
Other kit	Fendt Rogator 655 sprayer, McHale Fusion Vario, Claas Quadrant 2100 (80x70) and Agco 1270 (120x70) balers, Fendt Ideal 9T with 12.5m Powerflow header combine
Staff	Andy, Ros, George and Jonny Fraser plus seven other full-timers and two part-time

A brace of 4220 Fastracs are the go-to haulage machines of choice although the recent addition of a pair of Scania R450 tractor units and tanker trailers has massively reduced the amount of tractor roadwork.

Two 15.9m³ tandem axle Abbeys have just been replaced with 18m³ tankers.

Despite having been building its three-wheeler Hydro Trikes for over three decades, it wasn't until two years ago that the Dutch manufacturer added a four-wheeler to its offering. One of the very first went to Dorset contractors A&R Fraser.

and in that time has only had a couple of minor issues, both connected with the loading arm. At around 800 hours a relay in the arm's control electronics started to give trouble and 200 hours later a seal failed in the ram that lifts and lowers it. Both problems were sorted rapidly by the UK importer's service team.

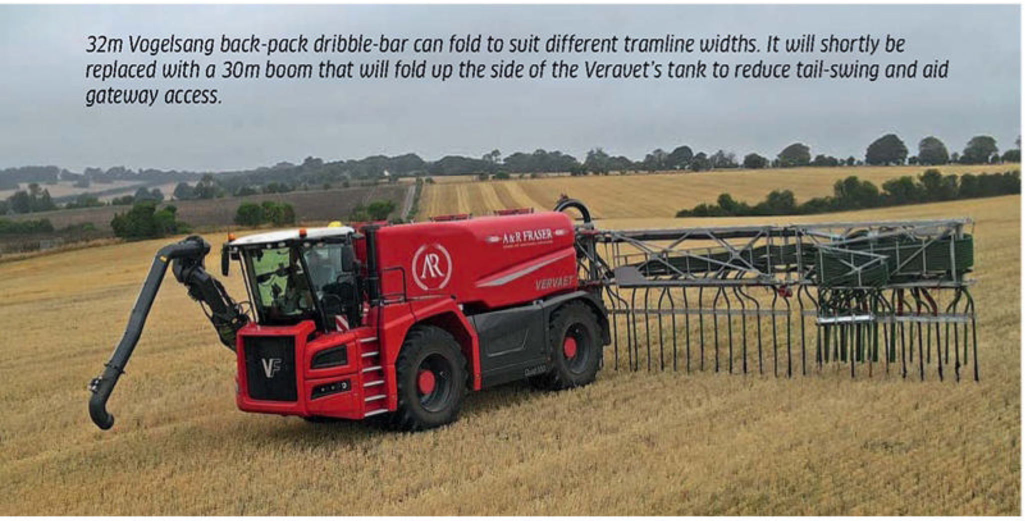
"I have a direct line to Riley's main engineer," explains operator Timmy Pitts. "Telematics allows them to see exactly what's going on and take over control of the computer if necessary. Most of the time they're able to talk me through any issues over the phone but if there is a problem we can't sort they're on the road to us straight away."

From a driver's perspective the Vervaet's cab and controls are a big step up from the Xerion. "Despite being a Claas cab, the Quad's touchscreen controls are so much better integrated – the joystick, armrest buttons and monitor all talk together along with the GPS rate controller and steering system."

Vervaet offers potential purchasers a choice of Trimble or John Deere GPS set-ups. Despite not already running any Deere kit, the Frasers opted for the green giant's system with a 4640 touchscreen and SF6000 receiver.

"We chose Greenstar because a lot of our customers run it so we can share field records and A-B lines. It's also possible to run Vogelsang's ISObus software through the screen so we can operate the dribble-bar without an additional control box. And in time we could add Deere's HarvestDoc NIR nutrient sensing if there's enough demand."

Nick Fone



32m Vogelsang back-pack dribble-bar can fold to suit different tramline widths. It will shortly be replaced with a 30m boom that will fold up the side of the Veravet's tank to reduce tail-swing and aid gateway access.

DATA SHEET

Vervaet Quad 550

ENGINE

13-litre Volvo Penta six-cylinder, max power 550hp at 1,710rpm, during application 1,400rpm, max torque 2,650Nm at 1,200rpm, service intervals 500 hours.

TRANSMISSION

Vervaet hydrostatic driving through Omsi steering axles with fully-locking mechanical differentials, working ranges 0-32km/hr and 0-40km/hr, hydraulic front axle suspension (with automatic levelling) and hydro-pneumatic cab damping, Michelin CerexBib2 VF900/60 R42 tyres.

HYDRAULICS

Bosch Rexroth load-sensing 130l/min at 200bar.

SLURRY SYSTEM

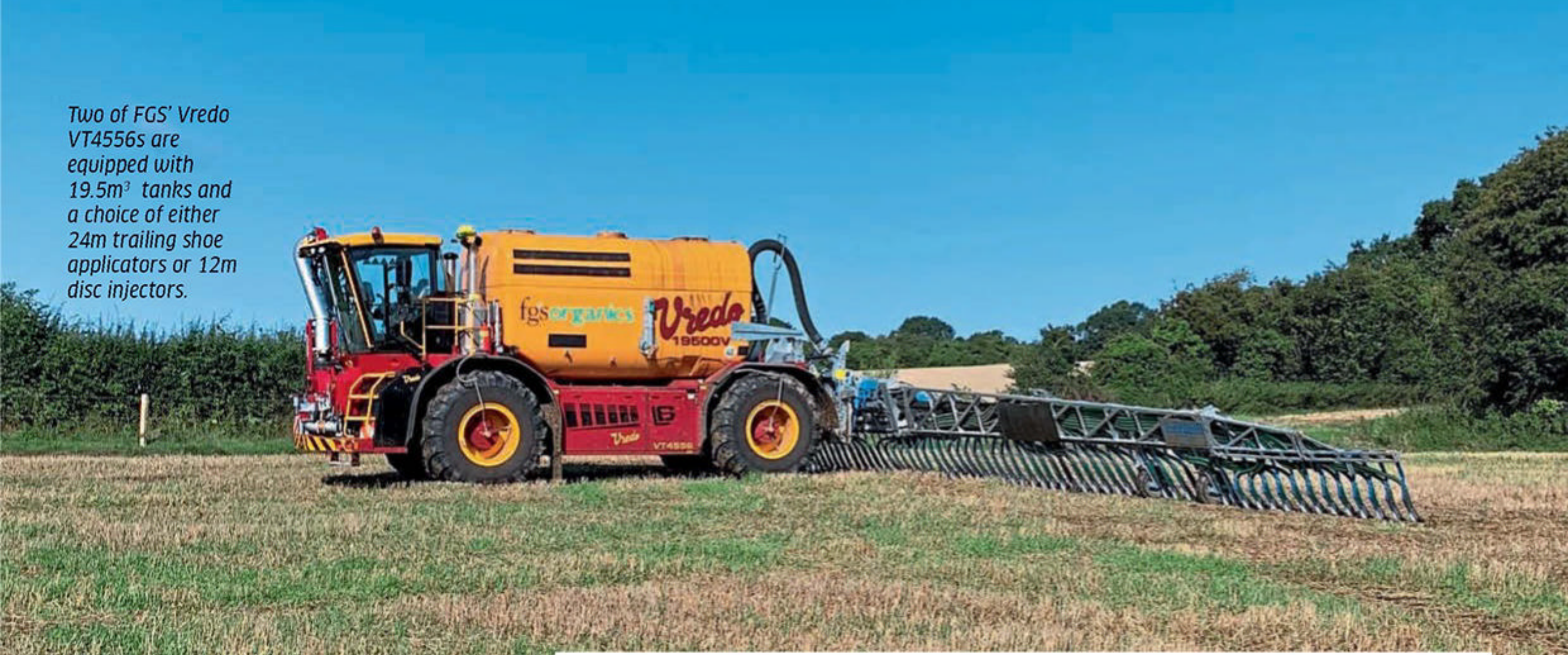
Garant Kotte 21m³ fibreglass tank with 12,000l/min Vogelsang rotary lobe pump followed by Vervaet Cyclone macerator. Applicators 32m rear-fold Vogelsang back-pack dribble-bar and 5.8m Joskin disc injector.

DIMENSIONS

Weight 27.1t with 32m applicator, turning circle 8.03m (inner diameter), overall width 3.0m, rear linkage capacity 9,000kg, Cat III with steering

A trio of four wheelers:

Vredo VT4556 SlurryTrac



Two of FGS' Vredo VT4556s are equipped with 19.5m³ tanks and a choice of either 24m trailing shoe applicators or 12m disc injectors.

Kent-based FGS Agri and FGS Organics have a long-established history of operating self-propelled muck and slurry application rigs. In the mid 1990s the business' founder – Trevor Heathcote – started running a single Big-A spreader. A decade later he invested in a fleet of Terragators and since then the business has had all manner of machines.

Today, sister-companies FGS Agri and FGS Organics run a total of six self-propelled solid spreaders and a further three dedicated liquid applicators. These include Ploeger and Vervaet five-wheelers, Claas Xerion 5000 with 28m³ Kaweco tanker and a quartet of Vredo four-wheelers – two with manure bodies and two with tanker packs, trailing shoe applicators and disc injectors. On top of that tractor-drawn spreaders, tankers and umbilical rigs help to further spread the business' reach. The collective array of spreaders, liquid and solid, allows the team to pick 'the right tool for the right job in the conditions'.

BOMECH
fgsorganics

Running nine self-propelled spreading rigs – both liquid and solid – of all different colours, FGS' Alister Bruford and Jamie West know the strengths and weaknesses of each. It's the Vredo's transportability that makes it a sensible proposition for a business that covers such a vast geographical area.

Weighing up options

While the focus of our attention here lies with the two Vredos employed on liquid application work, having such experience with self-propelled set-ups of all creeds and colours puts FGS' management in a strong position to comment on their various strengths and weaknesses.

Five years ago FGS Organics was running a Claas Xerion 3800 with a 25m³ Samson tanker alongside a 18.5m³ Zunhammer tanker for its slurry and liquid digestate application work. But by 2019 the workload had spread to such a wide area – from Kent up to the Suffolk coast, west across to Oxfordshire and south as far as the Solent – that it became

fgs organics
VT4556

With central tyre inflation systems and mid-mounted tanks, the Vredos' 39.9tonne all-up weight is spread evenly across all four 1,050mm wide tyres.

apparent something needed to change.

"Covering such a huge geographical area just didn't work with bulky trailed rigs," explains FGS Organics' general manager, Jamie West. "To make the operation effective we need to have machines that'll fit onto a standard low-loader – only the compact nature of self-propelled machines means this is possible."

This was a critical factor in selecting Vredos over any of the competition for liquid application operations. While the Dutch firm's four-wheelers might appear bulky, at 17.2 tonnes unladen they weigh in lighter than anything else. Stick a 24m trailing shoe on the back and that climbs to over 21 tonnes. Other coloured equivalents can tip the scales at well north of 27 tonnes often requiring Category 2 special permission low-loader movements – additional faff and expense that is ideally avoided.

Vredo was also the only manufacturer in the running at the time that could supply applicator booms that would fold up the side of the tank rather than sticking out the rear – another big factor in the machine's transportability and manoeuvrability getting into fields.

While the logistics of getting these big rigs from site to site can be a headache, there's another more compelling financial reason for avoiding running them on the road. With each of Michelin's 1050mm-wide tyres costing about £6,700, a full set of replacement rubber would come in at nearly £27,000. FGS' experience of operating big self-propelled spreading set-ups of any colour is invaluable in this respect - avoiding roadwork means their machines will typically do more than 5,000 hours before requiring a new set of boots.

Good start

FGS' first liquid handling Vredo 4556 arrived in the spring of 2019 and immediately proved itself as a capable performer.

"Travelling back to the headlands to unload artic tankers from field gateways the Vredo will deal with 60-80m^3 an hour. With ferry tankers running up the tramlines that figure climbs to closer to 100m^3.

"It was a big step up from our old Xerion 3800 and Samson slurry rig – close to a 15-20% increase in output, with a massive increase in traction and manoeuvrability."

Today's equivalent – the business' Xerion 5000 with 28m^3 Kaweco tanker purchased from retired Oxfordshire contractor Charlie Baker – has size on its side and a 36m dribble bar. As

DATA SHEET

Vredo VT4556 SlurryTrac

ENGINE

13-litre Scania six-cylinder, 450hp max power at 1500-1650rpm, max torque 2,200Nm at 1400rpm

TRANSMISSION

Sauer Danfoss hydrostatic driving through Omsi steering axles with fully-locking mechanical differentials. Two speed ranges; 0-19km/hr and 0-40km/hr, tyres Michelin XM28 1050/50 R32s, hydro-pneumatic front axle damping and mechanical cab spring/damping

HYDRAULICS

Sauer Danfoss load-sensing 404-litres/min (three pumps combined) @ 200bar

SLURRY SYSTEM

19.5m^3 fibreglass tank with 9,000-litre/min Vogelsang pump, turbo filler and Vredo macerator. John Deere HarvestDoc NIR sensor with SF6000 receiver, Applicators used; 24m Bomech trailing shoe and 12m disc injector

DIMENSIONS AND WEIGHTS

Unladen weight 20,400kg incl. 24m applicator, turning circle 11.80m (external), overall width 3.0m, rear linkage capacity 5600kg, Cat III with steering

Manufacturer information

With such a wide area to cover, the applicators have to be able handle a range of soil types.

BUSINESS FACTS

FGS Organics & FGS Agri

Application Work undertaken	Digestate, Sewage sludge, paper sludge, gypsum and compost spreading
Machinery Slurry:	2 x 19.5m^3 Vredo VT4556s, Claas Xerion with 28m^3 Kaweco tanker, 18.5m^3 Zunhammer trailed tanker, various trailed ferry tankers including Abbey, Redrock & Richard Western
Machinery Solids:	2 x 25m^3 Ploeger AT5105s, 2 x 18m^3 Vervaet Trike XLs, 1 x 22m^3 Vredo 7028 and 1 x 18m^3 Vredo 4556, 2 x Tebbe trailed, 4 x Bunnings 150 HD MK2 HBD, 4 x Bunnings Lowlander 150HD
Haulage	7 x Scania S550s and 2 x DAF XG530s with D-Tec tanker trailers, bulk tippers and low loaders; 6 x DAF rigid 20-tonne tippers
Tractors	2 x JCB 8330, 4 x JCB 4220, 12 X John Deere, 3 x Valtras.
Handling	7 x 14 ton Hyundai, 4 x 14 ton Kobelko, 3 x JCB 13 ton excavators, 5 x JCB & 1 x Kramer telehandlers
Staff	55 full-timers

a means of comparison, it'll handle 90-120m^3 an hour unloading from lorries and will peak at 160m^3 with tanker back-up. Obviously this all hangs on actual application rates but as a rough guide FGS would typically be spreading at around 10 tonnes/ha in the autumn and closer to 25 tonnes/ha in the spring.

The big Xerion's 28m^3 tanker also makes for a more efficient arrangement when unloading from lorries. Because it can take a full artic load in one go, wagons aren't kept waiting for it to pull off the last little bit. The Vredos' 19.5m^3 tanks mean there's a bit of waiting around for drivers – it's basically two lorry loads for three Vredo tanks.

Increasing workload

The last three years has seen demand for liquid application snowball and, with the parent company – Heathcote Holdings – now stretching as far north as Northamptonshire, there's an ever-growing customer base. To aid workload planning, a second Vredo VT4556 equipped with identical slurry kit arrived in Spring 2022. While it'll match its older sibling for output, its Stage V Scania engine tends to be heavier on AdBlue use. When it comes to fuel consumption both Vredos are significantly better than the Xerion 3800.

"The fact that the Vredo has variable speed pumps and a vario transmission means it's infinitely adjustable and can consequently be set to minimise diesel consumption whilst optimising productivity," notes Jamie. "We'll set our target spread rates and then set the transmission to vary speed according to load – that way the machine is never struggling."

Like so many machines of this type, the Vredo is equipped with a Claas Vista cab. But it is the control set-up that scores highly with the FGS team. By its very nature, it's a complex system that takes a bit of training and time in the seat to master. However, it's small things like double-taps of key buttons that initiate features like auto boom unfold that make a big difference to long days at the wheel. In a similar vein, Vredo's crab steer system is intrinsically intelligent, allowing the mounted Bomech trailing shoe to pivot with the system to allow a straight pull.

Obviously all this clever tech requires GPS autosteer for which FGS employs John Deere StarFire 6000 receivers which also run HarvestDoc NIR sensors to provide customers with real-time nutrient monitoring. Proving how well integrated this precision farming technology is, mapping will only start when the machine's boom is unfolded and the pump is running – that's felt to be essential for compliance and traceability.

Reliability

FGS' first VT4556 has clocked well over 5,000 hours in its four years with the company and aside from one major incident, has proved fairly dependable. At around the 2,000-hour mark one of the main transmission drive hydro motors failed.

"You can't put just anyone in the driving seat of these machines," says Jamie. "Operators need to be paying attention to everything the machine is doing, in particular transmission drive and pump pressures. When heavily laden they take a real pummelling on hills and really benefit from a delicate touch. Fortunately, the drive motor was replaced under warranty, it would otherwise have cost around £5,000 to put right."

"Luckily Vredo has an excellent independent service engineer called David Ogleby who gives us the confidence that if we're broken down we'll be back up and running as quickly as possible." comments FGS Organics' operations manager, Alister Bruford.

That's been more relevant to the company's 2022 machine. Despite having just 1,500 hours under its belt, it hasn't got quite such a good track record as the first one having been beset with all manner of minor issues from oil tank stress fractures to electrical gremlins. Thankfully they too have all been sorted under warranty.

One of Vredo's in-house built 12m double-disc injectors is used by the FGS team predominantly on grassland.

fgs organics

Spreading composted manure on the family farm at West Kyloe, Northumberland has improved soil quality on 250ha of arable and grassland and led to the establishment of a useful contracting business for the Leyland family

Turning manure into compost:

Banking on muck

Composting manure from cattle sheds is proving a worthwhile exercise for BJC Smalley & Co as the farm looks to improve its soil health and dependence on bought in fertiliser that can be spread on a range of crops throughout the year.

Farmyard manure is a useful tool in any farm's armoury to improve soils and reduce reliance on synthetic fertiliser, and in Northumberland, BJC Smalley & Co have been looking to maximise its use since 2016.

“We have access to muck on the farm from 120 beef cows and followers, and we thought there had to be a way to make better use of it,” explains Michael Leyland, who runs the business with his father, Hugh. After calving in April, weaning takes pace in October and before the steers go off to market in March, the cattle are bedded on straw from West Kyloe's cereal crops – there is 250ha of land in total, made up of arable plus temporary and permanent grassland.

Muck to compost

“We began looking for a more efficient way to utilise the muck we produced for faster nutrient cycling whilst reducing artificial input requirements. We now muck out into windrows, aiming to keep them as consistent as possible, mixing from the back and front of the sheds for even material decomposition,” he says.

Once the windrow is tidied with a loader and turned using a windrow turner this creates the ideal environment for the bacteria, fungi and other decomposing organisms in the organic matter to get to work, breaking the manure down more quickly than in a field heap. Muck which can take several years to decompose otherwise will compost in 10-12 weeks. Aerobic bacteria multiply with the addition of oxygen, creating heat and the familiar ‘steam'; and with such high activity turning is used periodically to maintain oxygen content, keeping the aerobic biology happy. Temperature is checked periodically using a probe to monitor progress.

Michael came across a used Sandberger 4.0m tractor-driven windrow turner, which passes through the windrow and uses teeth to lift and turn it, aerating and ‘fluffing up' the material. This speeds up the process by maintaining aerobic conditions for the biologicals within.

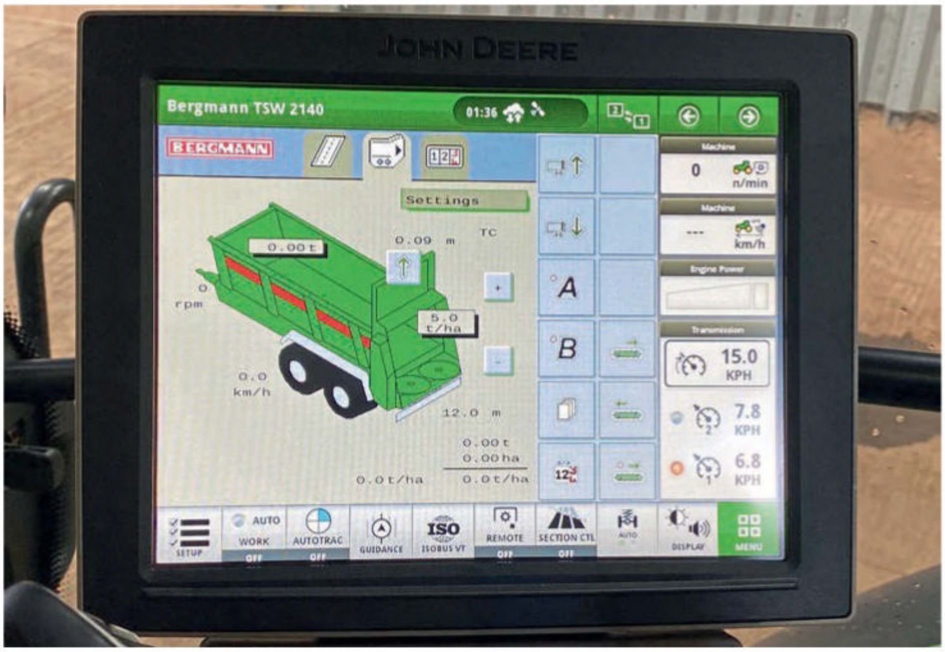
“It wasn't in working condition and we had to spend money on it to get it going, but keen to see what could be created, we got it working. We quickly saw the increased rate of decomposition, producing a nutrient-rich soil amendment, which would spread better than muck, offer improved nutrient

KEEPING IT BRIEF

The Menart compost turner can shred and aerate a 5.0m wide, 2.0m tall windrow.

Composted material can be spread more accurately and used to reduce the artificial fertiliser bill.

Composting can reduce the volume of material that needs to be spread by 66% in under four months.



Full ISObus control on the Bergmann offers fine tuning of the spread pattern by one touch activation of preset height for the slurry door, along with easy monitoring of the remaining load and application rate.

The Bergmann spreader impressed Michael Leyland with its features which include a single axle with tall wheel offering increased rolling radius for easier pulling and reduced compaction.

availability and be more flexible in application," he explains.

Spreading the word

Word soon got out, and a local farm that was in a straw for muck deal wanted to try composting.

"It wasn't long until 10,000 tonnes of muck was being turned, and we soon realised that the Sandberger was on its limit. We actually sold it to the Cherry family, hosts of Groundswell, and it is now in use on their farm."

Meanwhile another second-hand compost turner had become available, having been used on a sludge/sawdust contract in Cumbria. The Menart 5300SP has a span of 5.0m and can cover up to 1,000m per hour, working on rows up to 2.0m high; by measuring the rows Michael can estimate how much material there is after a first turn.

"The teeth on the rotor shred and aerate the material effectively and it's actually designed with driven wheels to 'push' the tractor, although with an AutoPowr gearbox like the John Deere 6215 we have on it, the tractor pulls it when in work. The outer wheel is hydraulically driven and the controller in the cab matches its speed to the tractor" Michael explains.

After running for a few years on a European hitch the drawbar was redesigned to the UK-style hitch (below the pto shaft) whilst integrating hydraulically adjustable drawbar height to improve in-work and road transport performance; the road wheels were also upgraded. Folding into the transport position was controlled by electric valves on the original design but Michael converted this to hydraulic spools, operated via the tractor joystick.

Muck demands

"The rows need to be uniform as lumps significantly increase turning time; we changed a lot of shear bolts on the Sandberger in the early days, but the Menart uses a slip clutch," explains the enthusiastic farmer.

Genuine replacement teeth have proved to be prohibitively expensive but a local engineer has fabricated suitable alternatives; Michael comments that he would like a new machine, but is finding sourcing one difficult.

"There are few tractor-driven options, with 3.5m width machines being much more common. However, these are too small for the typical tipped trailer load which makes them unsuitable for larger scale windrows and contracting purposes."

A range of additives can be mixed into the manure, including shredded green waste, topsoil, gypsum and rock dust.

"Mixing in small amounts (50-90kg/tonne) of P-Grow or Fibrophos can increase P and K levels; on our farm we need to add calcium to balance high magnesium, plus P to balance out good levels of K. Topsoil adds beneficial biology and binds the organic matter; and we also get green waste on a non-commercial scale, from local landscapers or our own land.

"The end product is worth more than the sum of its parts so the more variety of 'ingredients' the better – we've even shredded oyster shells for calcium, and wet poultry litter is useful for a dry row. Additions can be added prior to any turn and the windrow turner is a very effective way of creating a consistent mix."

Composting has improved the management of manure from the farm's 120 cows and followers.

The Menart 5300SP windrow turner has a span of 5.0m, and uses a large rotor to lift and aerate the muck in the windrow.

Replacement teeth for the rotor (left) are fabricated locally

It is then placed in long windrows for more efficient turning.

A good initial Carbon:Nitrogen (C:N) ratio of 30:1 is vital if aiming to create a premium product, Michael explains. “Typically, manure is higher in N so we encourage the liberal use of straw to maintain a good balance. The end product is not applied for its nitrogen content and a small amount is used by biology but the natural stabilisation of N means it is far less volatile to gassing off or leaching. This is recognised by the lack of smell when spreading. The aim is for a 10:1 ratio in the final product.”

Humates, although costly unless sourced in bulk, are another possible addition, boosting fungal development and useful for garden soil amendments.

Wet winters can create challenges but liberal cattle bedding and adding green waste can reduce the risk of the moisture being too high and minimise the risk of leaching. Michael recommends that livestock are kept away from the rows to prevent them poaching the surrounding area and squashing air out of the row; “You would never see livestock on a commercial composting yard!” he quips.

Downsizing

Tele loaders are a key part of the armoury, and adding a new JCB TM320S not only gives a 50km/hr gearbox for contracting but ensures that the existing machine is always available at home during busy periods. Another invaluable piece of kit is a Murray Machinery push-off bucket with grab which makes handling and adding materials easier. To utilise other organic wastes, a 20m^3 Zago SD20 slow speed shredder has been purchased. Pto-powered, the shredder uses twin augers rotating at 20rpm to break down material including brash, garden waste and grass clippings. It is placed in a windrow for eight weeks before being screened. Fines are either blended with manure or spread straight.

“We screen out the oversize matter with a Powerscreen trommel that was purchased second hand. It currently has 15mm screens in and produces a good product, but is slow, so we may switch to 20-25mm.”

Oversize material is used as a mulch on new hedgerows, with the Zago’s discharge elevator proving handy for distribution. “It’s very helpful in retaining moisture in dry conditions and reducing weed competition; the oversize also can be used for cattle bedding or go back for re-shredding.”

The composted material is also applied at a lower rate on a ‘little and often’ basis and the process concentrates the nutrient content, meaning the spreader is effectively carrying twice the value of product. For the livestock or mixed farm it’s an efficient way of managing muck, making it easier to move around the farm and spread when time allows. Once the rows have reduced to two thirds of their original size they are ‘doubled up’ to take them back up to size for easier turning and improved maturing; at West Kyloe when the sheds are mucked out in December, by March the composted manure is ready to spread.

Getting it spread

Another challenge was to find a way of applying the finished product accurately and

A Powerscreen trommel screens the shredded green waste for more effective composting.

Matured windrows which have reduced in volume through the process before 'doubling' for easier handling.

in the fine pattern needed to make use of it as a soil amendment. After hiring spreaders for two years, Michael embarked on purchasing his own.

"Prior to turning muck, we used to spread all muck on 15ha with two conventional spreaders in a day; now with a concentrated and consistent product it is applied to up to 150ha and spreading all year: in spring, post-silage and working on the tramlines in growing crop."

Looking for a machine that could apply at lower rates with wider spreading widths, he trialled a number of designs.

"A disc spreader gives a more consistent result on composted muck and can spread on growing crops," he explains, "Working at low rates of 5t/ha it's effectively like spreading a prill, We'd had K-Two, Bunning and Hi-Spec on hire all of which were good machines, but none were exactly what we wanted."

A visit to the Bergmann factory with importer Continental Soil Technology to look at the company's spreaders proved more fruitful, with its precision engineering and use of jigs for manufacturing impressing the pair.

"I like the fact that the TSW range is designed for use with spinning discs - the 1.8m wide body matches the two 900mm discs which gives a consistent pattern across the spread width," comments Michael. Another plus is the single axle and large diameter wheel on the 14 tonne capacity 2140E. "It has a large rolling radius which makes it easier to pull but also a large surface area in contact with the soil for reduced compaction."

Durability is designed in, with shaft drive, slip clutches protecting the rotors and wide angle pto, he points out. The spreaders also have a high standard spec. The drawbar weigh cell is mounted in the spoon hitch, so are not affected by the movement of the sprung drawbar, with two other cells on the axle. Control is via ISObus, with much of the software developed in conjunction with Stuart Cameron of Continental Soil Technology.

"It can be hard to get the application rates accurate when measuring the flow of muck, but Bergmann incorporates a 'slip factor' which calculates how much extra the bed chain needs to move in order to move the material a set distance, improving rate accuracy."

The TSW can work to 24m, but the more refined materials that include 'dust' type additions combined with the low spreading rate make it easier to apply at 12m; there's a good overlap and consistent pattern at 12m, Michael points out. A camera above the floor chains monitors product flow, while a second at the rear covers the spinning discs.

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OUT 5TH MAY

SCAN ME

Green waste is a useful amendment; a Zago shredder breaks down material from the farm or local landscapers.

"The door can be easily adjusted to a set height for to improve the flow to the beaters as the load empties, and a 'one touch' control from the ISObus screen activates opening," explains the farmer.

Compost benefits

The farm looks better for the use of composted muck, the pair believe: "Artificial product has a negative effect on soil biology, comments Hugh. "Soil health is now improving due to a holistic approach."

They admit that it's hard to measure soil and compost biology. "But we take the approach that if it looks good, feels good and smells good, it must be right. The farm is performing better so we must be doing something right," says Hugh.

Soil testing also reveals that nutrient levels are improving.

No-till too

A transition is also being made through min-till to direct drilling, which they say has also contributed to improving organic matter. The John Deere 750A disc drill gives the flexibility to direct drill including into grass or cultivated ground and also copes with the rocky, thin soil. "Apart from the ISObus control it's a fairly basic design, but does what we need; the only thing it is lacking is multi-hoppers. If we want to blend cover crops, for example, we put then in in a concrete mixer and then into the hopper."

"Lots of our customers are on the reduced till/direct drill path; it's a selling point to integrate the use of manure into no-till, as you don't need to incorporate it and can apply on tramlines. The fine product is no problem to drill into and can be spread without disturbing crops," comments Michael.

Michael Leyland checks progress in a windrow.

The turning process also 'sanitises' the material, killing weed seeds. "This is especially important as a cultural grass weed control, in a no-plough regime. Although it can't be 100% guaranteed, customers are happier that the product is cleaner especially in muck for straw deals where there is high chance of importing problematic weeds."

Suitability for spring spreading means that compost can be applied when crops are actively growing, benefiting from the availability of nutrients.

"We've also found that it can be put on grazing land and animals quickly returned to the field, whereas stock farmers are reluctant to spread muck due to health risks. There's no smell and it's not disruptive."

He adds that by adding stable, active organic matter, which provides a carbon source to buffer nitrogen, the farm's use of nitrogen fertiliser has decreased, going from 220kg/ha to 170kg/ha while TSP and MOP have been eliminated completely without a yield penalty. "Available N is relatively low in cattle FYM and a little is used in the process, however stabilising of the total N makes it less leachable and kinder on soil biology. A typical finished analysis is 10:4:18, although this varies greatly depending on the source of the muck. Valuable levels of trace elements are also found and along with the biological content and organic matter makes it a valuable soil food."

Samples are taken from each windrow, allowing amendments to be added or simply for record keeping.

Taking stock

Attention has also been paid to the rotation. When a Higher Level Scheme agreement came to an end, grassland was integrated into the system using a local contractor's Cross-Slot drill to establish Kale into the sprayed off grass, and then used as winter grazing.

"The cattle effectively ploughed the field, and then after a pass with a Väderstad Carrier it was put into the cropping, proving to be our best performing land that year. We've kept it in crop since and believe that the soil has really benefited from the breakdown of the grass and kale and the cows trampling it. It showed us the value of livestock and has led to a big change in the rotation."

Track building and maintenance is another arm of the business.

West Kyloe is increasingly moving to direct drilling, but the John Deere 740A offers the flexibility to also work in cultivated ground where necessary.

The pair were also deploying rotational ploughing, but since dropping winter barley and being able to drill straight into grass it is no longer required.

“Arable land that has become ‘tired’ is now put into a three-year grass ley, for grazing and silage, sprayed off and direct drilled, keeping fertility at the top. Field performance is considerably better after the soil has had a proper break.” Thus the rotation from grass is generally wheat, oilseed rape, cover crop before spring oats or peas then back to wheat, depending on field requirements. Oilseed rape shows a good response to the improved soil health, Hugh points out; after drilling, a pass with a Sumo low disturbance subsoiler tackles any compaction.

Work for others

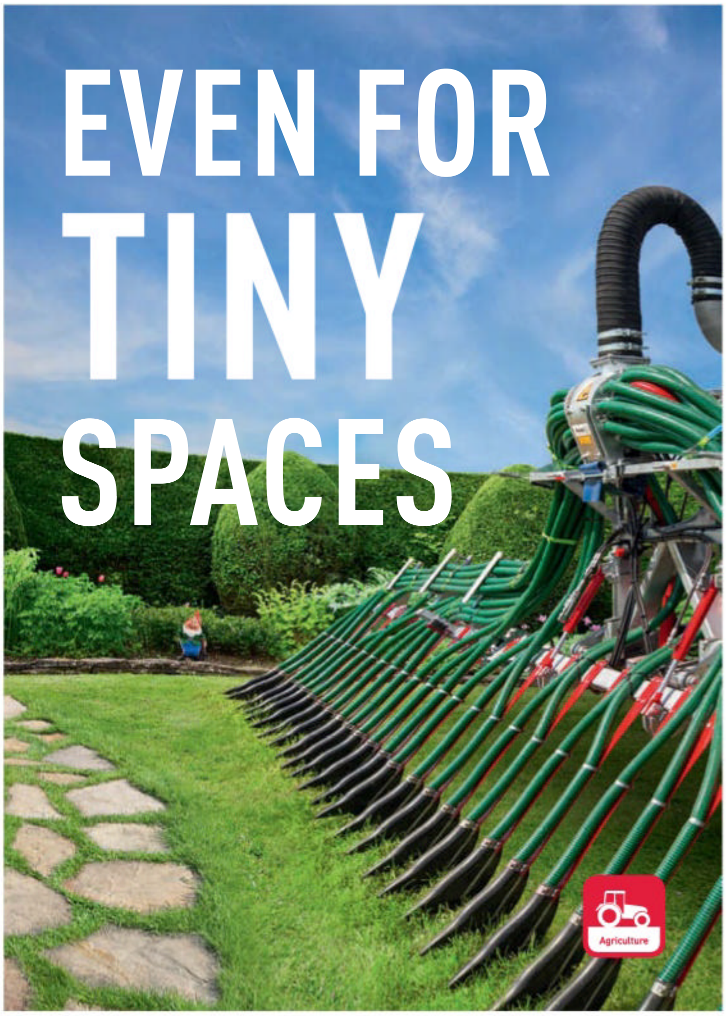
The contracting side of the business has developed so that Michael now offers a windrow turning service to farmers within a 20-mile radius, covering 25 farms and turning approximately 50,000 tonnes of product in 2022.

“Due to the high capital cost of the turner and the high output it is a difficult machine to justify for one farm, so we offer the service to help farms that want to solve the same problems we faced when we started. Foreign bodies can be an issue, although most customers are pretty good - they understand that when you go down this route, muck is a valuable product. I keep a grinder handy to take string off the turner’s rotor or pull it out manually.”

“Windrow turning has offered our business a valuable diversification but is also an important part of our farming practice. It could be said that while we have saved on fertiliser, we’ve invested heavily in machinery, but it’s a long-term plan and an investment in soil health and our future.”

Jane Carley

Michael (left) and Hugh Leyland, investing in machinery for the future of their farm’s soils.



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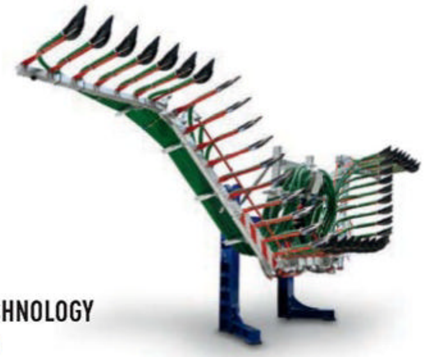

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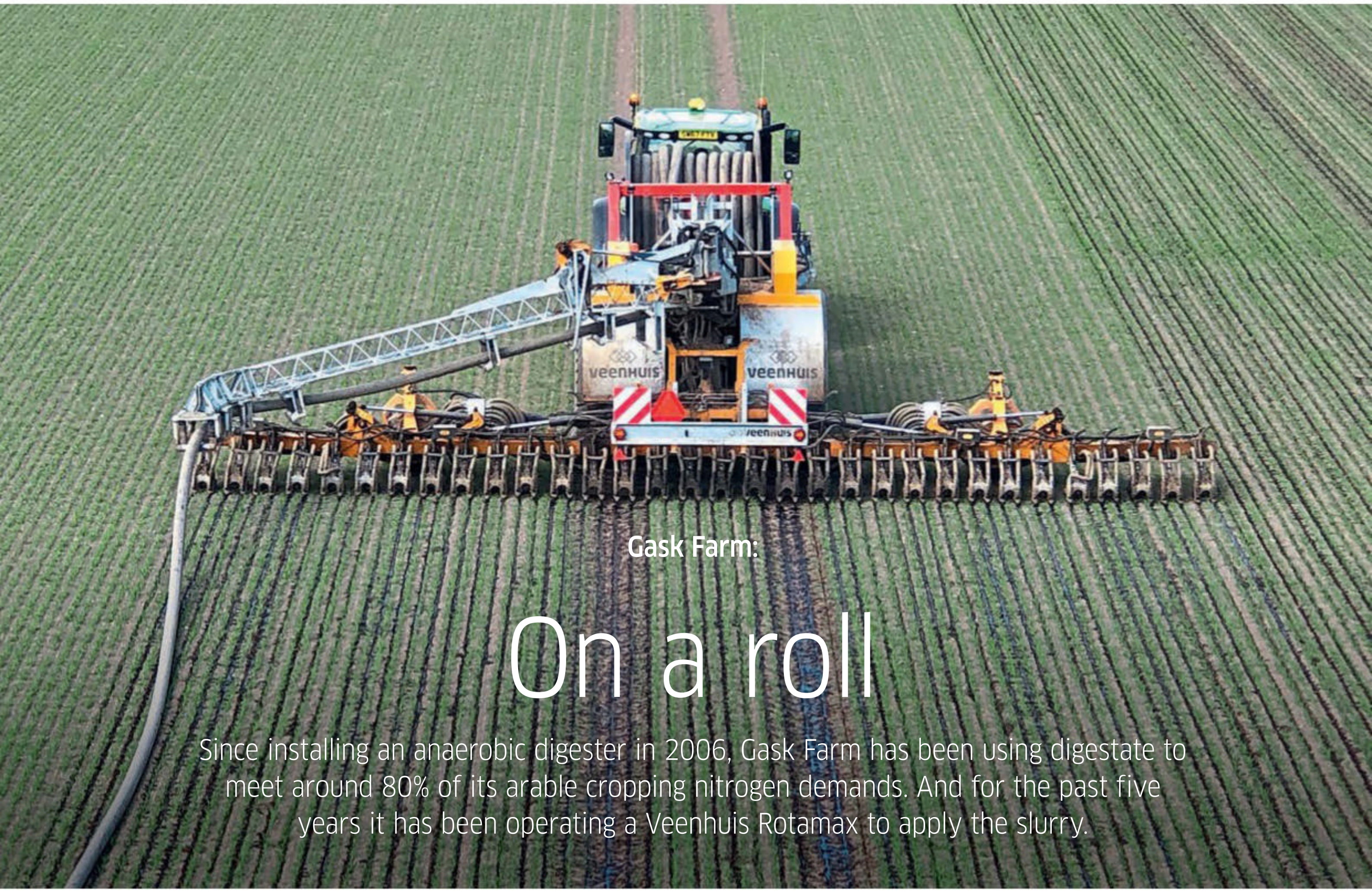


Gask Farm:

On a roll

Since installing an anaerobic digester in 2006, Gask Farm has been using digestate to meet around 80% of its arable cropping nitrogen demands. And for the past five years it has been operating a Veenhuis Rotamax to apply the slurry.

One of the attractions for Gask Farm installing the first AD plant in Scotland was that the digestate could be used to meet a lot of the nutritional needs of the combinable crops grown on the 485ha enterprise in Turriff, Aberdeenshire. But how that organic fertiliser is applied has evolved over the years. And for the past five seasons a Veenhuis Rotomax umbilical system has been used for all of the liquid application.

Up until two years ago the farm had its own pig unit, so dealing with the slurry was not a new experience. Abattoir waste was also being applied to land, but Andrew Rennie points out that at the time they could see the writing on the wall for applying the effluent and belly grass directly to land with changes in legislation. Blending the two products with the pig slurry as the feedstock would be the ideal alternative treatment that could be then used on site. With the ball rolling the 600kW anaerobic digester was commissioned, and the creatively named BioGask part of the business was created.

"There is not that much energy in pig slurry as it is used by the pig, so it was just more liquid to deal with," explains Andrew about the decision to exit the swine side of the business. "We're now using food baking waste, and waste products from the fish factories nearby and the abattoir."

Less traffic

The digestate was initially applied by tankers fitted with a boom carrying multiple splash plates to achieve a working width of 24m, helping it match in with the tramlines for spraying and fertiliser spreading.

"You could end up using the same tramline three times with the tanker," recalls Andrew. "Travelling on the wet ground was causing compaction, and there was also the issue of getting stuck. And we had to use a nurse tank to keep the mud in the field."

An umbilical system should have been the ideal solution to applying all of the digestate to arable crops. A 12m dribble bar supplied by a 5in feed pipe then stepping down to 4in drag hose was purchased.

"We had to use a hose humper and a cow horn to stick to the tramlines, but this meant you always had to run over the main feed pipe and you are always risking the pipe rolling and twisting. Some of our ground has sharp stones that would nip the outside of the pipe causing bursts and you then lose pressure," explains the farmer. "It is totally different to grass where everything just slides."

As well as the expense of fixing and replacing

KEEPING IT BRIEF

The Rotomax unrolls and then rolls back up the umbilical pipe as it moves across the field, reducing pipe wear and not rubbing the crop.

Cereals grown with digestate develop a waxy layer on the straw, which then coats the inside of the combine.

An underground mains network drastically reduces the set-up time; it takes just 30mins to arrive in the field and start work.

The Rotamax is used to apply 20 to 50m^3 of digestate per hectare and can be worked in crops up to 8-9in tall.

Operator Euan Gray drives the Rotamax 90% of the time. The machine is controlled through the ISObus terminal.

hose, it proved to be a very time-consuming operation for the three full-time staff plus extra help at busy periods as some contract work is also undertaken.

"We took a couple of years to see where we were going," says Andrew. "We looked at self-propelleds too, but you are always needing to travel back to the nurse tank or lagoon to fill up. The Rotomax is not a cheap machine, but it is more versatile for us."

Enter the Rotomax

Manufactured by Veenhuis, the Rotomax uses a reel – in the case of Gask Farm this holds 600m of 4.5in pipe. The pipe is unrolled as the outfit travels down the field, placed to the side by the rear-mounted boom. On the return leg, the boom swings across, allowing the pipe to be rolled back up, avoiding the hose being dragged across the field.

With the remote-operated Doda HD35 pump, the entire spreading operation has been reduced to just one man, with operator Euan Gray doing the majority of the driving. To make the digestate spreading operation as slick as possible, Gask Farm has also installed an underground mains to distribute the liquid from the various lagoons and the nurse tanks. The 6.0m long lengths of 6in plastic pipe have a glued joint, with hydrants at key points in the middle of the field for the Rotomax to be attached to, minimising set-up time. A back-up Bauer tractor-powered umbilical pump means it can be set up and waiting if needed.

"We can now do a 120 acre block (48ha) without disconnecting any pipes," says Andrew. "It depends on the dosage rate, but 100 acres (40ha) per day are possible; once he has started he is never stopped. 1,000 to 1,500m^3 per day is easy, and because we have the volume, we can pick the days."

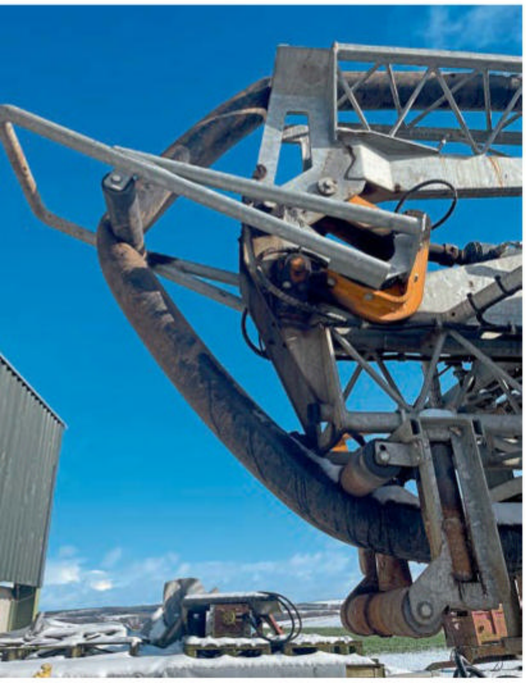
Around 20% of the total tonnage is applied to stubbles in August and September, but the bulk of the digestate is spread during March to mid-April to the growing oilseed rape, wheat and barley. "95% of our P and K is from the digestate," adds Andrew. Meanwhile 80% of the nitrogen comes from the slurry, with the remainder of the N applied at a variable rate as granular fertiliser using the results from a handheld N leaf test for the final application. Biomass indexing has previously been carried out following the digestate application, but the results proved to be not that different from the handheld unit. Soil testing is carried out by SOYL through Frontier. The actual nutrient make-up of the digestate is consistent with the feedstock analysed every three months.

What extras

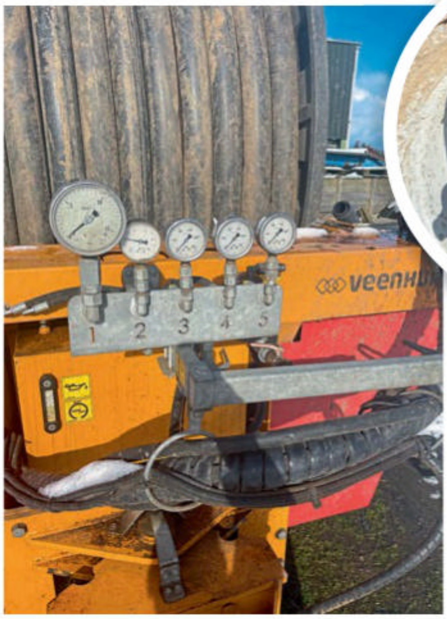
Given the known value of the digestate, the Rotomax is not equipped with an NIRS unit but it does have several extras fitted to the base machine, which, today, has a starting price of £340,000. Two options that Andrew feels are very important are the steering drawbar, which results in neater headland turns with the 12m Veenhuis Premiumject 1200 disc injector; the other is the neat weight transfer system that attaches to the tractor's top link pin. Pressure can then be applied, forcing the front wheels of the John Deere 6215R (soon to be replaced by a 6R215) into the ground.

"Every bit of kit goes over the weighbridge so we can set tyres at the right pressure," notes Andrew. "Michelin is our preferred tyre on new machines but we are using BKT as replacements." Speaking of pressure, the 900/65 R32 (35.5LR32) tyres are pre-equipped for a central tyre inflation system. For now the pressure in the Alliance tyres is altered manually in the field; the current setting is shown on one of the gauges on the front of the machine. The fast-tow compressor used to clear the lines can be employed to inflate the tyres again from a central coupling at the front, with manual taps to isolate each tyre. The 6215R meanwhile has a PTG central tyre inflation system relying on the air brake

Digestate is shifted from the 600kW AD plant using three Conor tankers to lagoons and nurse tanks.



The hose is actually layflat on the reel (you can see it slightly kicked here on the folded machine). It only looks like solid pipe because it is kept under pressure.



The 35.5 LR32 tyres on the Rotamaxx can be inflated from the front of the machine, the pressure shown on the gauges. A valve is turned once the required pressure is reached.

compressor to do the inflating of the 650/85 R38 back and 600/70 R28 fronts.

You would be right in thinking the Rotomax is a heavy lump of kit when the pipe is full of digestate: the outfit weighs in the region of 37t depending on how much hose is reeled out. “But you are only carrying the weight on the headland,” points out Andrew. “The rest of the time the weight is shared with the disc injector, and the 6215 is big enough to handle it.”

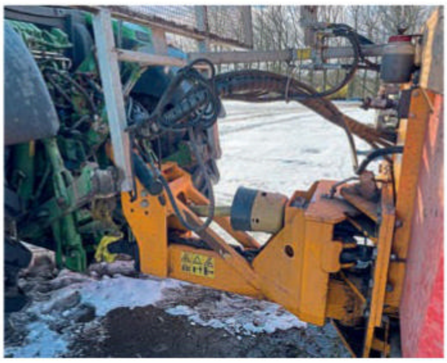
Another option ticked at the time of ordering was the extendable axle, allowing the Rotomax to travel on fresh ground compared to the tractor wheelings. The other notable extras are the two auto-greaser units to cater for the myriad of lube points on the trailed machine. But there are still 92 nipples, which due to their position, need to be manually greased.

One of the biggest challenges for the operator is maintaining the hose pressure, which is 9-12 bar in work. This pressure is reduced to 3 bar when the injector is shut-off at the headland, with the engine revs at the pump adjusting automatically. If air gets into the hose – especially risky if using the nurse tank which is filled by HGVs – it can cause the pipe on the reel to become slack at the top and not come around … like a hastily wound up extension lead. Granted, undoing this mistake with the Rotomax can be a little more time consuming!

Discs and cereals

Most would expect to find a trailing shoe or dribble bar at the rear, but instead there is the aforementioned 12m disc unit. This does one pass in the tramline and one down the middle of each sprayer bout, although that changes this season as Gask Farm has just bought a new Bateman with a 36m boom and plans to stick with granular fertiliser. It has also recently invested in a new sowing rig, a 6.0m Horsch power harrow drill with seed and fertiliser capability to give the plant a strong start.

Sometimes the disc injector will land on a sown row and end up splitting the plant, but this doesn’t seem to harm the crop. “It is amazing how it comes back,” notes the farmer. The discs only work around 20-25mm deep so there is not much disturbance to the crop. For oilseed rape the aim is to get in before it reaches leaf extension so there is minimal plant disruption, while for cereals the crop can reach up to 9in before it is time to call it a day.



The steering drawbar and the hydraulic weight transfer top link are both options. Andrew says he would not be without.

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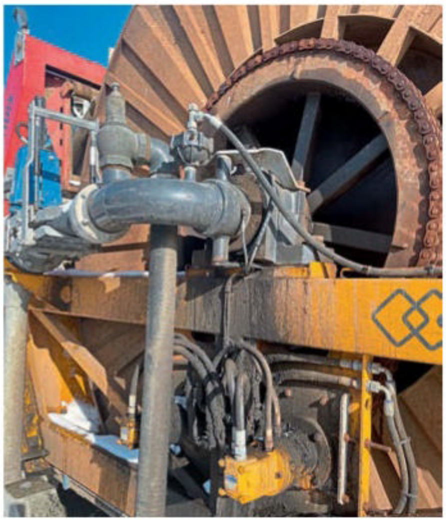
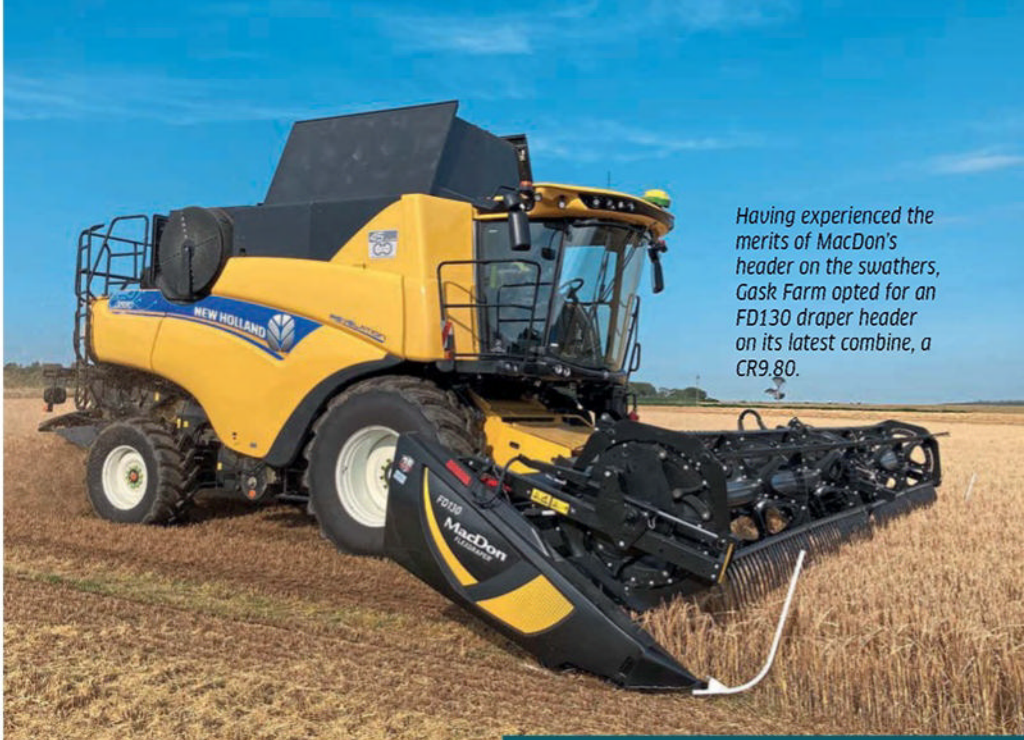


Hydraulic motors rotate the massive reel holding 600m of hose.



Having experienced the merits of MacDon's header on the swathers, Gask Farm opted for an FD130 draper header on its latest combine, a CR9.80.

"The open slot from the shallow disc allows the soil to easily absorb the digestate; there is very little run off. The liquid only has a 4.5 to 5.0 dry matter so it is quite watery stuff," explains Andrew. "Sometimes I think we should be putting more on, but when Euan lifts the injector out of the ground you can see how much liquid there is, so we stick with the same rate."

Waxy harvest

One downside of using digestate is the waxy layer the crops develop, which then coats the internal workings of the combine. Despite an all-Deere tractor fleet: both of the combines are New Hollands, a straw walker CX8080 and a rotary CR9.80.

"When we had a demo of the older CR it wasn't able to cope with the waxy straw, but this new configuration is much better and it can outperform the straw walker. There is a 95% chance the 8080 will be replaced with a rotary," says the farmer. The John Deere dome and screens are switched over from the tractors to the combines at harvest, running through a SolSteer box to tap into the New Hollands' integrated auto-steer.

When the waxy straw was proving particularly challenging for the combine headers, Andrew has previously operated one of his MacDon swathers to cut around 160ha, which is the reason why the CR has a header from the Canadian manufacturer. This header is said to be better at coping with the laid crop.

Swathing is becoming popular once again. The business now operates four MacDon machines, three of which are the newer type.

BUSINESS FACTS

Gask Farm	
Cropping	81ha oilseed rape, 81ha winter barley, 81ha wheat, 243ha spring barley for feed and malting
Machinery Slurry	3 x Conor tankers $15m^3$ and $18m^3$nurse tanker and Veenhuis Rotomax umbilical applicator with 12m disc injector
Arable	Horsch 6.0m power harrow seed/fert drill, Kverneland ploughs, Bateman RB35 self-propelled sprayer 36m, 4,000-litre, Kuhn fertiliser spreader
Tractors	John Deere 6195R, 6210R, 6R215, 6250R, 7530
Handling	New Holland LM742 telehandler
Harvesting	New Holland CX8080 and CR9.80, four MacDon swathers (2008, 2014, 2017 and 2022)
Staff	Three full-time plus seasonal

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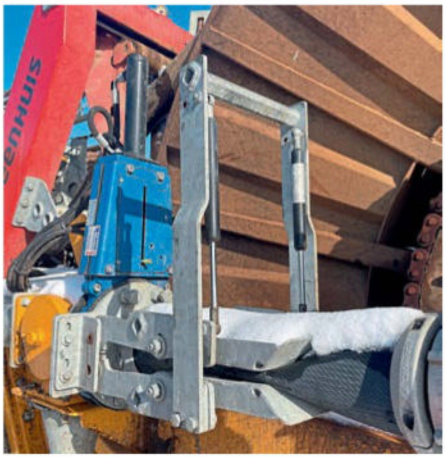
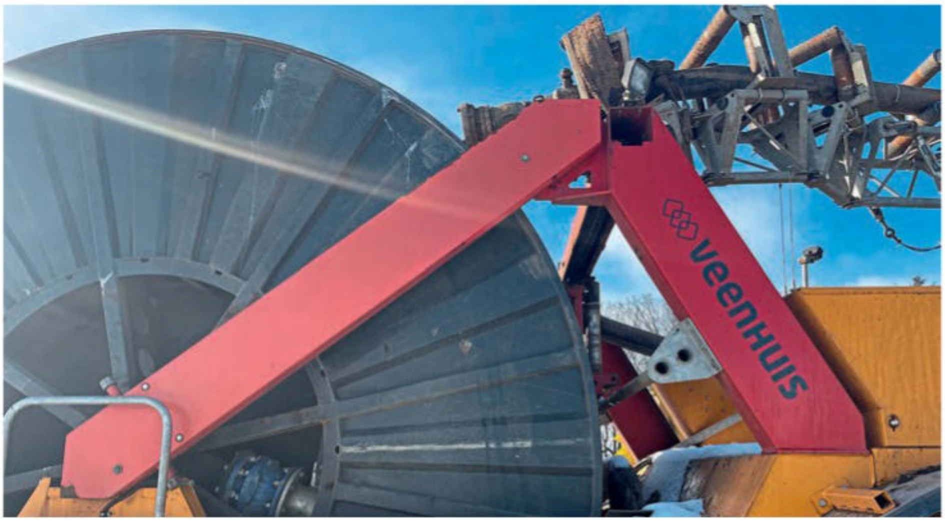
"We used to do a lot of contract swathing, but around 15 years ago with the trend to bigger and bigger combines many farmers started desiccating," he says, adding, "there are a lot of wind turbines in this area for a reason!" Given the sometimes blustery conditions, waiting nervously for four or five weeks for a desiccated crop to be combine-ready can test the mettle of many a farmer, and there now seems to be a swing back to swathing where the rape is usually ready within a week to 10 days. Given this increasing demand the business now operates three of the newer type MacDon swather models with the better performing headers, two with 6.0m tables, while the newest, a 2022 machine, has a 7.6m cutterbar to better match the appetite of combines in the North East of Scotland. The oldest unit is a 2008 model with a 5.4m front and was one of the last units imported by Shelbourne Reynolds.

Mervyn Bailey



The gas struts press on a plate to help maintain pressure on the pipe as the gate valve opens and shuts.



A mechanically linked shuttle slides on a rail between the red A-frame on either side, helping maintain an even roll in and out.

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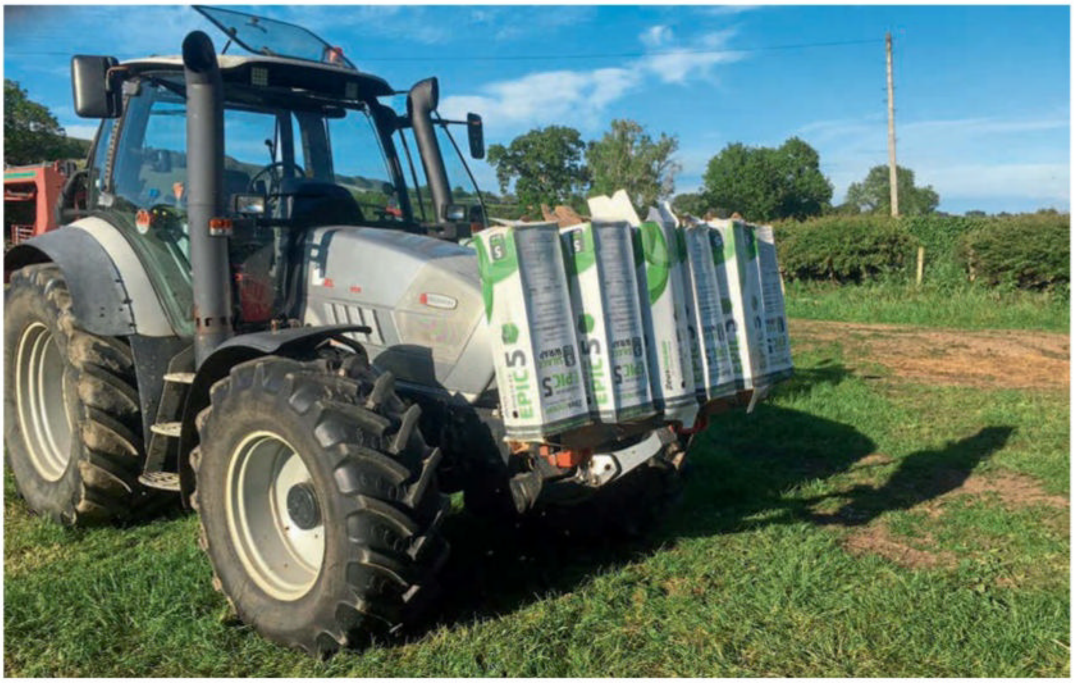
Yorkshire farmer/contractor, Nigel Thornborrow:

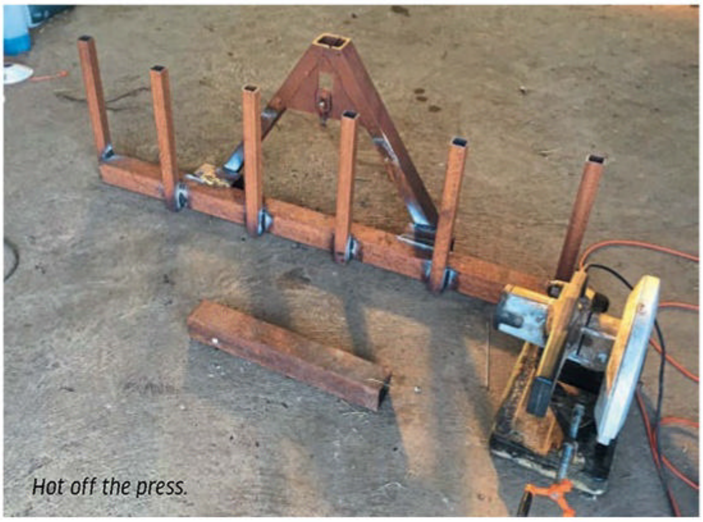
It's the Law – Part One



Loaded up and ready to roll. Frighteningly now able to carry over £1000 of wrap.

Cyril Northcote Parkinson. Not heard of him? Understandable, as it was nearly 70 years ago when he proposed the theory that work expands to fill the time available. This subsequently became known as Parkinson's Law. Initially, his theory was concerned with efficient use of time which then evolved to focus on the inefficiencies of bureaucracy – more of that in Part Two next month.

Completing assignments during my degree course always came down to the wire. Even on the few occasions where I would shock both myself and my peers by making an early start on things, productivity fell off a cliff and with it so did enthusiasm for the task. Although started in haste, not one of those assignments were handed in early. More typically, my modus operandi of trying not to let my education get in the way of socialising would see me finally galvanised in to action the evening before the 9am deadline. Students - I cannot endorse this attitude as results were at best 'mixed'.



Hot off the press.

This was all on a personal level, in that if I did not perform then I did not get the grades – no real harm done. Now, however, with family and farm dependant on my efforts, attitudes are far less cavalier. And so it should be, deadlines are hitting us hard in the face every day in agriculture, from hungry livestock to ripe crops all demanding our attention. Nature won't wait. During busy periods tasks often have to be begrudgingly done to a 'that'll do' standard.

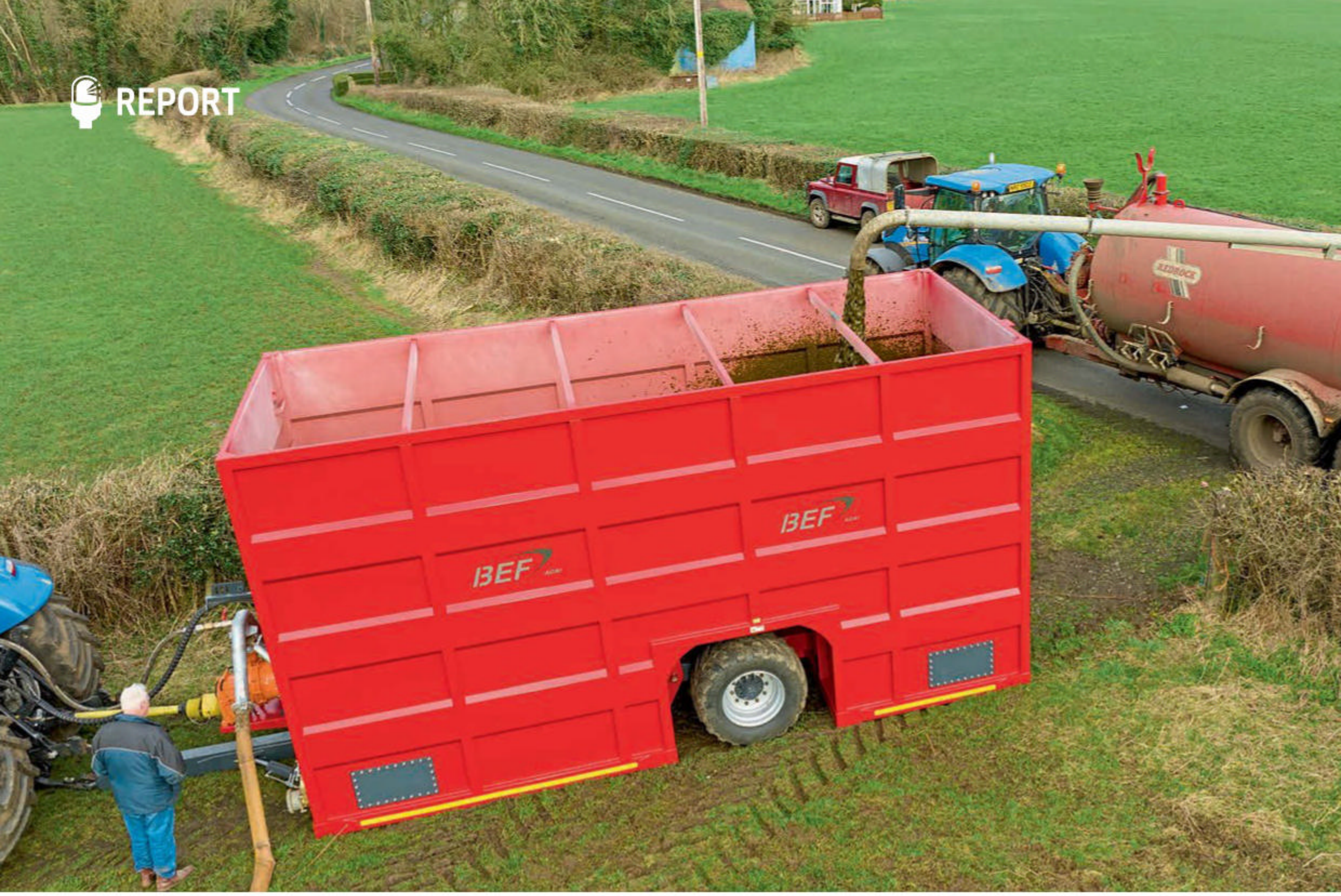
One such example of this is my hastily concocted wrap carrier. Faced with a loader tractor trying to bleed to death and my right-hand wrapper man getting ready for his on-farm wedding (how dare he?), I suddenly needed a method of carrying some more wrap on the Hurlimann's front links. In a scene reminiscent of Scrapheap Challenge, a quick rummage round the yard yielded a used A frame, some bits of 80mm box and a useful stretch of 40mm box.

Quite why I chose to use the stick welder I don't know, but no time was wasted cleaning joints as the slightly damp 6013 rods burnt through the rust with gusto. Cue a flurry of sparks and some very localised tanning to reveal a workable solution, going from design concept to loaded up and gone in little over an hour.

Had there not been 300 bales impatiently awaiting my attention then I could have allowed more time for the task and added a few embellishments, like paint. Although a long time has passed since June, the carrier remains unpainted as many other tasks, all with their own deadlines, have rightly taken priority.

Nigel Thornborrow

Nine months on and still not painted.



The 54m³ nurse tank comes into its own on larger blocks of away ground, allowing the ferry tankers to unload and get going again. Photos: Andrew Robinson, of AR Imagery.

McConaghy Contracts:

Keeping the show on the road

A 54m³ nurse tank has increased efficiency for Northern Ireland firm McConaghy Contracts as it looks to boost work rates on larger outlying blocks of ground and keep the road tankers, well, on the road.

With farming operations looking to expand whenever possible and take on more ground, land blocks will often become rather fragmented and out of reach of light-footed umbilical spreading set-ups – not ideal when the slurry spreading window is getting shorter, resulting in huge demand for contractors such as Andrew McConaghy.

Based near Bushmills in Northern Ireland, McConaghy Contracts is a three-generation family business, with Andrew managing the day-to-day agricultural operation while his father, Robert, focuses on digger and ground work. Even grandfather and business founder, Bob, is still actively involved in the decision making process and helping out.

It's not just silage and slurry that keep the firm busy, but also crop establishment and combining; indeed, there aren't too many jobs this contracting enterprise doesn't tackle.

Its latest investment is a bespoke nurse tank to make the slurry enterprise more efficient when operating its umbilical system on any

KEEPING IT BRIEF

Adding a nurse tank means the road tankers are not held up.

The umbilical system doesn't have to pause while changing tanks.

Steering drawbar dramatically improves manoeuvrability.

Andrew McConaghy explains that the business has an increasing slurry workload, and its investment in the nurse tank will keep all the operation's machines on the move ... and earning.

blocks of land away from a customer's main buildings and yards.

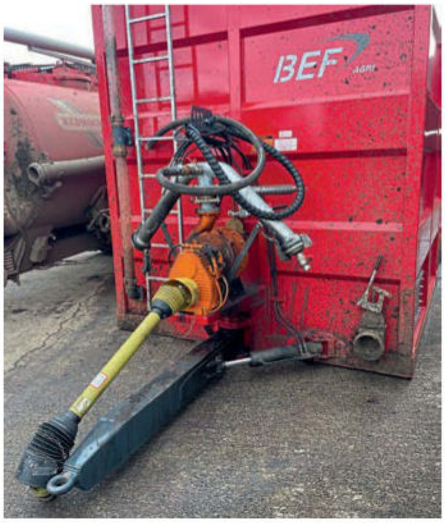
"There are two things that have meant we're doing more slurry work," explains Andrew. "The splash plate ban, which is already in place for certain stock farms, and, secondly, farmers are seeing that we can do the job much quicker. Also, farms are finding it hard to get in the help, something that I think is only going to become even tougher."

Waiting game

Slurry spreading has always been one of the services on offer for as long as Andrew can remember, with a ground-drive tanker initially used when the going was soft. An umbilical system was the next step in the aim of light-footed application. Today there two umbilical outfits, supported by an 11m^3 (2,500 gallon) tanker on 900 tyres with a 9.0m dribble bar and three Redrock 18m^3 (4,000 gallon) ferry tankers.

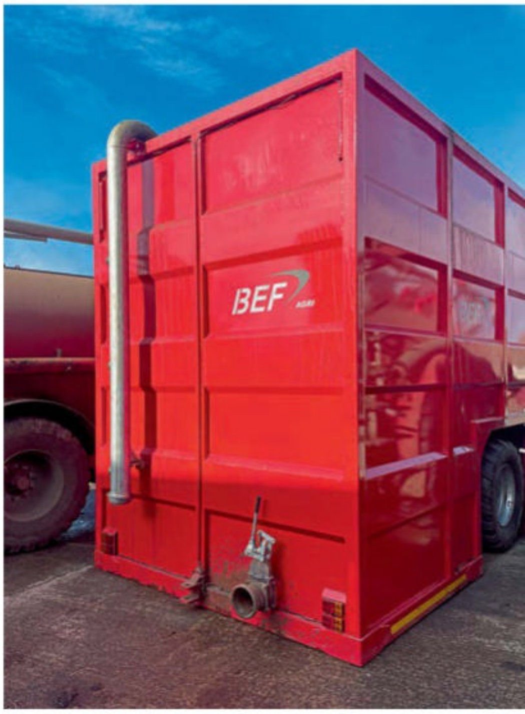
"We have DCI arms on the tankers so we can connect to the umbilical pipe in the field," says Andrew. "This is fine for small blocks or fields, as it saves reeling up pipe. But more farms now have larger blocks of 50 to 80 acres (20-32ha), and this is just too slow ... you have tankers waiting to unload and the farmer is wondering why he's paying for machines that are just hanging around.

"We had been using a trailer as a nurse tank but this could only hold one tanker load, so they would be waiting if we were reeling up and moving fields. And then at other times we would be waiting for the tankers. So, for this season we decided to invest in a proper nurse tank. We contacted Philip Bartlett, as we'd seen another tank that he'd made a couple of years ago."



Because the nurse tank is used on larger blocks of land, a Doda HD35 pump was installed instead of a sludgigator. This allows the slurry to be pumped over longer distances.

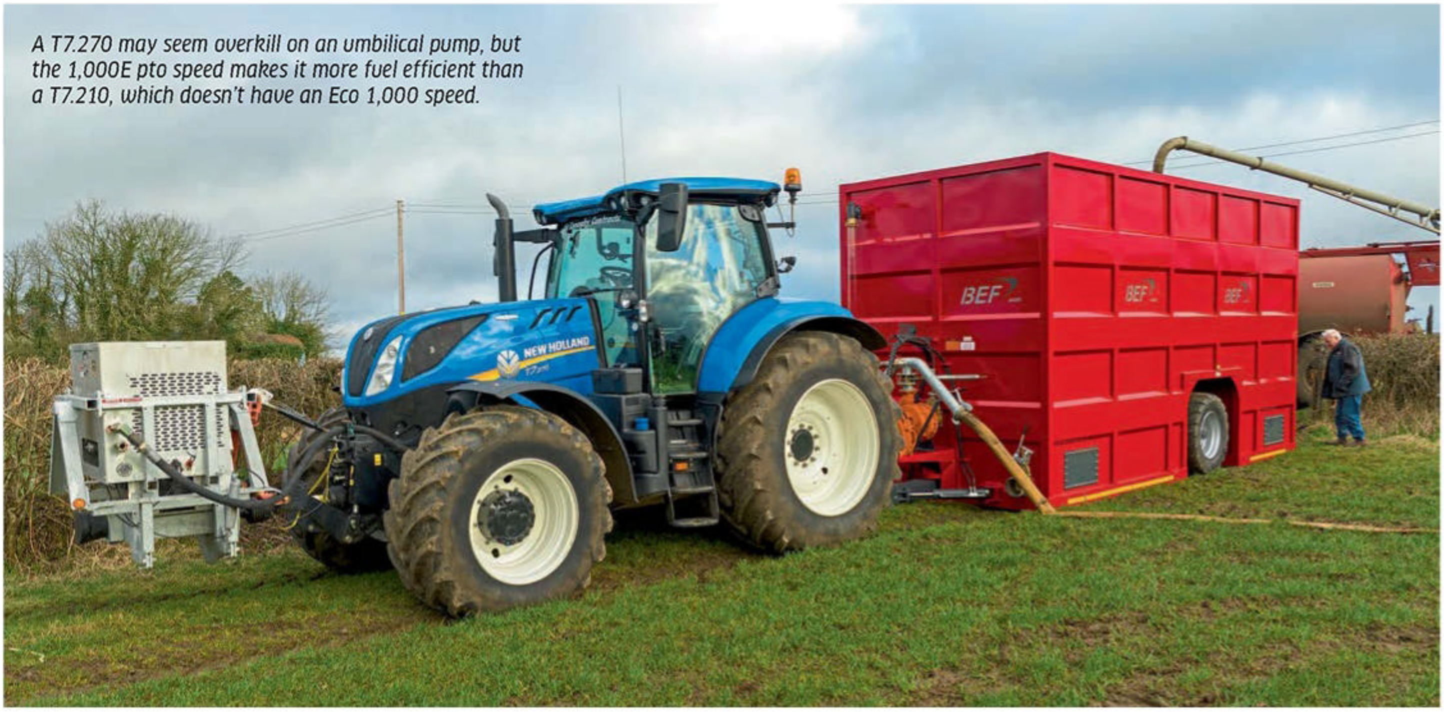
Two lift arms push the high-speed axle down, with check valves ensuring it stays in place.



A sight gauge is mounted at the front of the tank, while eye glasses are used at the back.

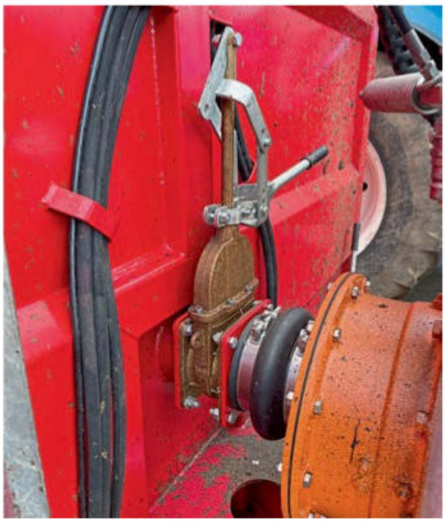
The build

The first tank that Philip Bartlett, of BEF Agri, produced was longer, 8.2m, and not as tall (3.0m). Andrew wanted a shorter but taller tank, so they would still have the capacity but then the shorter unit should be more manoeuvrable. The original tank was also fitted with a steering drawbar. "I thought it


A T7.270 may seem overkill on an umbilical pump, but the 1,000E pto speed makes it more fuel efficient than a T7.210, which doesn't have an Eco 1,000 speed.

The hydraulic ram on the steering drawbar has 400mm of travel, enough for a near 50% offset. This makes a big difference to tank manoeuvrability.

Access panels located on the left-hand side provide easier cleaning out of any lumps or solids at the end of the slurry spreading season.


A gate valve can be used to isolate the pump if a repair is needed.

was totally unnecessary, but Philip insisted we did include it and I am already glad we listened to him," Andrew concedes. "You can even walk the front of the tank around to get in a tight space; it's brilliant."

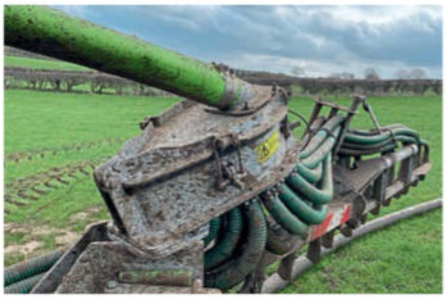
So, what else was included in the tank build? Well, there's the already mentioned steering drawbar that enables the tractor to offset around halfway to either side. There's no suspension, because the 5,500kg unit only contains slurry in the field, where the 650/45 R22.5 tyres are raised up hydraulically. This means the base frame of the tank sits on the ground and spreads its weight over as large an area as possible.

A Doda HD35 pump feeds the 4in umbilical pipe; the unit fitted is actually a refurbished pump that the McConaghys already owned. Bartletts fabricated the feed-off pipe sited up above, enabling the pipe to be run out from either the left or right. "We put the T7.270s on the pumps, because they have a 1,000 speed eco so are actually more fuel efficient than our 210s, which don't have an eco speed," points out Andrew.

There is also a coupler for the AH Tractor Compressor, a front linkage-mounted 300CFM pto-powered compressor for blowing the umbilical lines clean.

At the front of the nurse tank, there's a handy double-height sight tube so the operator can easily keep an eye on the level of slurry in the tank. Then at the rear there are five clear bubble caps so the tanker operators can also monitor the tank level. The 10 New Holland T7.210s and two T7.270s are equipped with

McConaghy currently operates two umbilical units. Both incorporate 12m wide AgQuip dribble bars.



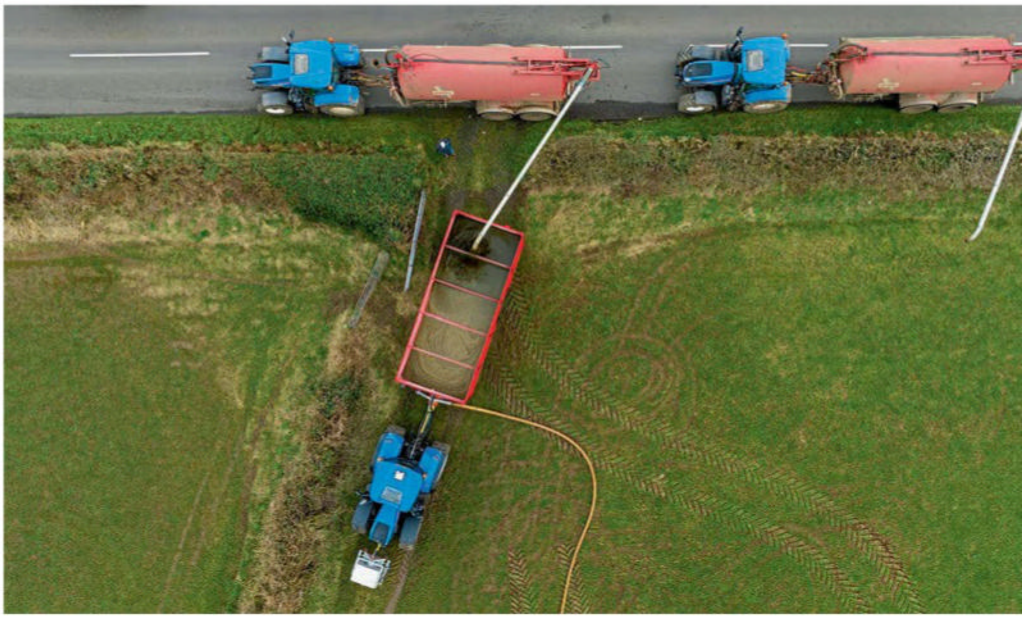
Andrew McConaghy praises the quick access into the AgQuip distributor: just flick four over-centre latches, and the top plate hinges open.

WHO IS BEF AGRI?

Bartlett Engineering and Fabrication has been on the go since 2017 and is based nearby in Ballymoney. Over-hedge booms for mounting on various makes of slurry tanker, plus other agriculture-related work such as sheds and gates keep the two full-time engineers busy.

This is the second nurse tank it has produced. The first unit was for nearby Wilson Bros Contracts, who has been using it for five seasons.

Philip Bartlett, of BEF Agri, was tasked with building the nurse tank for McConaghy Contracts. The first tank shown here was longer and lower.



All three road tankers are fitted with over-hedge booms for working with the nurse tank. The inside of the nurse tank has been coated with corrosion-resistant ‘Tank Guard’, a polymine novolog paint.

The T7.210 spreading tractors run on 710/55 R30 fronts, 900/50 R42 rear tyres.

two-way radios so all the operators can stay in contact.

Also at the rear of the tank is an additional gate valve, and for tankers that don't have an over-hedge boom there is a loading pipe they can manually connect to. Another detail are the two panel covers on the left-hand side to help remove any sediment or lumps that may build up during the slurry spreading season, which kicks off at the beginning of February and finishes in mid-October.

Like the first BEF nurse tank, the inside of this new tank has been spray painted with a product called Tank Guard, a polymine novolog coating. The exterior of the tank has a two-pack paint finish and, overall, it does look well thought through.

Early days

The new nurse tank was delivered in mid-February and, even though it's not used for every job, it has helped to boost output and keep the ferry tankers on the move.

McConaghy charges by the hour for its slurry spreading operations. “We've thought about charging by the cube, but for now it's by the hour,” comments Andrew.

“Hourly we aim to get out 30,000 to 35,000 gallons with both systems, although, with the new nurse tank, in long days and in large acres you can shift around 250,000 gallons plus in a day … no problem,” says Andrew. “With the DCI arm, and in smaller fields etc, I’d say we would be aiming more at 150,000 or more.”

Mervyn Bailey

The 21-strong Fastrac fleet operated by K W Wilson and Sons was a major talking point among visitors at the dispersal sale.

K W Wilson & Sons sale, Lincolnshire:

Slurry kit hits the sweet spot

Right kit, right crowd, right weather … the K W Wilson & Sons sale of specialist slurry equipment could hardly have gone any better, according to Brown and Co auctioneer, James Walton.

With more than 400 vehicles in the car park, the recent K W Wilson & Sons retirement sale was the biggest Brown and Co auction since before the COVID pandemic. Even the auctioneer on the day, James Walton, was surprised by the turnout at Sandbraes Farm, Caistor, Market Rasen, Lincolnshire.

"I'd been concerned that the highly specialist nature of the slurry equipment up for sale might limit its appeal. But this proved to be completely unfounded," Mr Walton says.

"Folk travelled from all four corners of the UK and Ireland, and we also had a very strong international presence online, especially from Eastern Europe. Everything fell into place. We had the right kit, the right crowd and the right weather. And every lot made its reserve and sold. The trade was literally on fire."

Interestingly, a big percentage of the equipment went to existing customers of the Wilson brothers – Mark, Russell and Ian – who are retiring from the digestate/slurry spreading sector. There's a sizeable population of pig farms and AD plants in North Lincolnshire, and, with the Wilsons ceasing to trade, it would seem these businesses are now planning to take their spreading work back in-house.

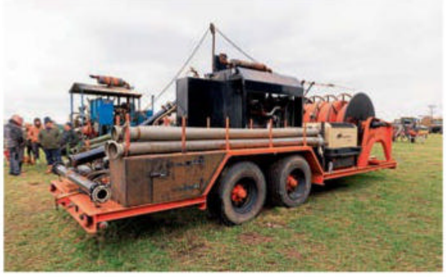
The kit on display varied in age and hours, but all looked to have been well maintained. This, along with the Wilsons' reputation within the sector, explains the bullish demand and values. Plus, there are still long lead times for new machines, which applies just as much to this specialist equipment as it does to the more mainstream market.

"We sold eight identical Record tankers, and I could have easily sold another dozen," says Mr Walton. "The first one made £20,000 and the last one around £30,000. Which also proves the old theory – that the first buyer of similar lots generally gets the best deal, as prices tend to go up as you work your way down the line."

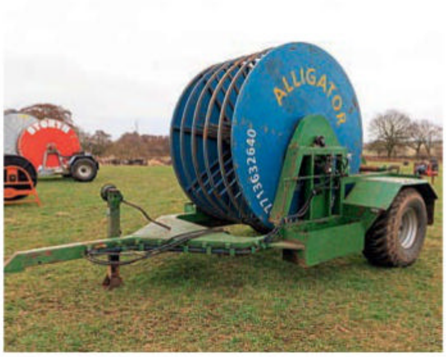
Arguably the highlight of the day was a 2019 Samson PGII28 tri-axle trailed tanker with a 36m dribble bar unit, which went under the hammer for a whopping £317,000. With a current on-farm price of about £450,000, that still represents a fair saving on new for the buyer. In any event, there are currently no new PGII28s available in the UK.

Of the more general machinery, there were an impressive 21 JCB Fastracs up for sale, ranging in age and hours from one to 21 years and 595 to 23,000 hours, respectively. Even the 23,000-hour Fastrac fetched a strong £18,000, and, according to Mr Walton, this bold price seemed to stiffen the resolve of potential purchasers when bidding for the younger examples. The top Fastrac price of £124,000 was paid for a one-year-old 4220 on 595 hours, which, along with most of the other younger Fastracs, was sold on with an 8,000-hour transferable warranty.

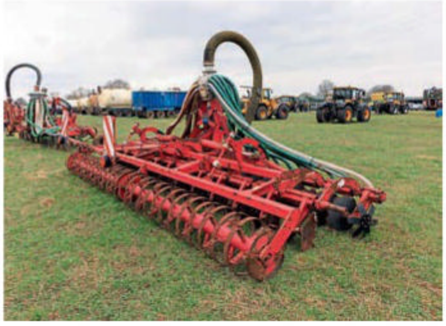
Photos: Tim Scrivener
Text: Andrew Faulkner



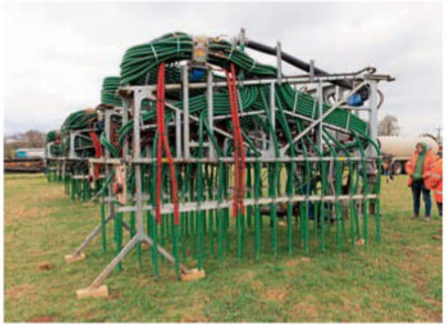
£58,000 was the end result for this 2019 Gissing FE self-contained umbilical pumping unit. An FPT engine powers the Criman PTD100KK pump with a hydraulically driven primer pump and a Krohne flow meter. An Ingersoll Rand compressor blows out the pipe, which is on an 800m mounted reeler.



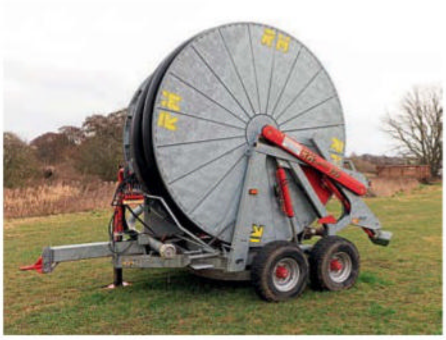
£2,300 was the final hammer price for the older Alligator TR2000 5in trailed reeler model with new hydraulic motor and fitted with chunky 550/60 R22.5 BKT flotation tyres.



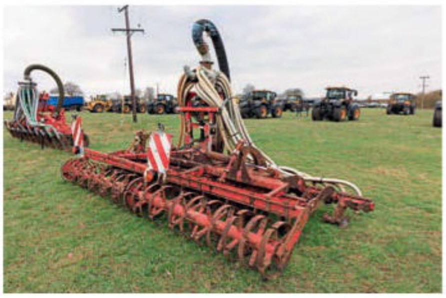
The 2017-vintage Horsch 6.0m Joker 6CT disc harrow furnished with Vogelsang slurry kit left the sale field for £10,100.



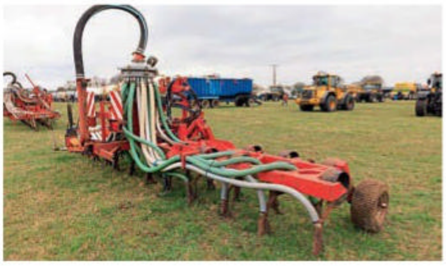
The 2013 Vogelsang 24m mounted dribble bar for use with an umbilical system came complete with a Badger flow meter. It eventually found a new home for a decent £31,000.



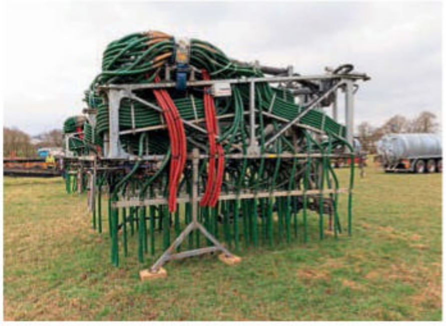
Manufactured in 2016, the RM Super Rain 135 500m slurry reeler with 5in alkathene pipe made £7,500. The set-up boasts an onboard hydraulic system with 5in Storz fittings.



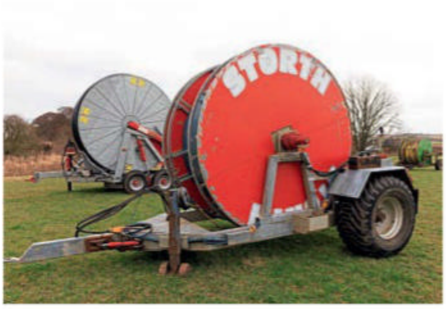
The Horsch 5.0m Joker disc cultivator with a Vogelsang macerator was missing some of its wearing metal. Nonetheless the set-up was still a relative bargain at £700 if you were up to the task of giving it a thorough overhaul.



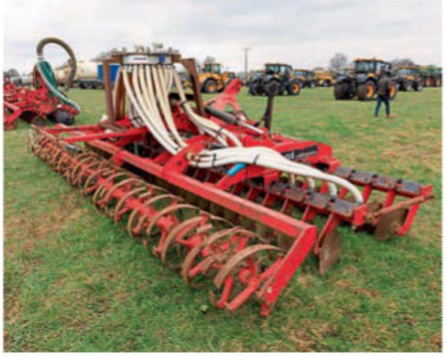
There were two of these Evers 7.2m wide cultivators with Vibroflex tines and Vogelsang slurry parts. One of the outfits made £6,500, while the pictured model went for £7,200.



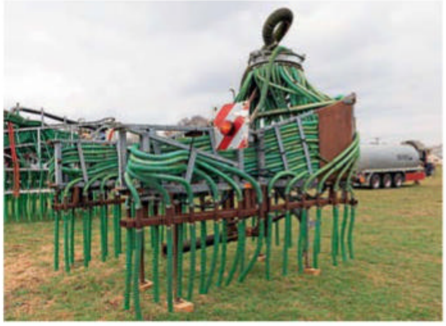
The 2017 Vogelsang SSG1140 capable of working at 32m or folded down to 24m had been owned from new and made £40,000. The spec includes air-operated section shut-off, Krohne flow meter and Tanlake application monitor. There was also a 2018 version with the same spec which went for £39,200.



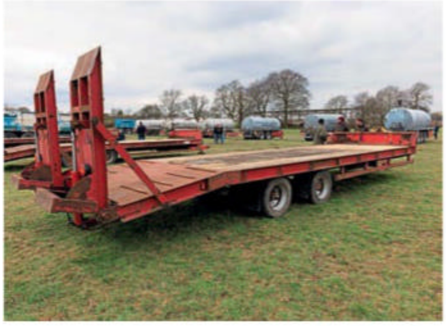
There were two Storth trailed reelers on offer. The 2015 model fitted with 1,800m of 5in snap tight and Gollmer & Hummel pipe sold for £10,000. The 2018 2,000m capacity unit was carrying 1,800m of 5in Gollmer & Hummel pipe and went for a substantial £30,000.



Another disc harrow pairing used for slurry incorporation was this 2014 Ilgi Arragon 600 with Vogelsang slurry kit. It sold for £2,800.



This Zunhammer 12m dribble bar (with Vogelsang macerator) for using with an umbilical system sold for £950.



There were two JPM tandem-axle low loaders on offer with a 6.0m bed and 1.5m beaver tail, hydraulic ramps and air brakes. The hammer went down at £6,200 for the pictured 2007 trailer, while £6,000 secured the 2011 version. A 6.7m tri-axle model left the field for £6,200.

For spares or repairs, this 2007 Rolland Turbo Classic 22-32 16t trailer with air brakes, hydraulic tailgate and 560/60 R22.5 tyres made £5,000. Another unit, which had been scorched by fire and on super singles, sold for £6,200.

There were a number of ferry tankers on offer from Belgian manufacturer Record. This 2011 16m^3 has air brakes and suspension with a 14,000l/min pot-powered pump. It achieved £10,200, while the 2010 tanker with the same spec sold for £13,000.

This 2022 JCB Fastrac 4220 had the least hours with 595. Tyre wise it was on 600/70 R30 Nokian road tyres on the back and 600/70 R30 BKTs on the front. Interestingly it didn't have a front linkage. It sold for £124,000 with an 8,000 hour transferable UK warranty. The other 2022 4220 models went under the hammer for £123,000 (745 hours), £120k (838), £106k (1,352), £100k (1,646 and 1,893 hours).

The 2010 3230 with plus pack, had a 65k/hr box and Ceat 540/65 R30s on the front. The clock was showing 12,831 hours, and it found a new home for £25,500.

This and another 2007 Rolland Turbo Classic 22-32 16t benefited from having silage sides and 560/60 R22.5 tyres. They both made £8,200, while a 2008 version brought in £8,700.

Prices for the P33T tri axle tankers were £20,000, £20,800, £23,500, £25,000, £25,800, £28,000, £33,800 and £30,500. All have a capacity of 23m^3 featuring commercial running gear with rear steer for the super singles. The galvanised tankers are filled with a 14,000l/min Battioni vacuum pump and have an 8in hydraulic docking funnel for emptying. The newest of these arrived with Wilsons in 2016.

£87k was the hammer price for his 2021 Fastrac 4220, which, like the others, had Nokian back and BKT front tyres. It had clocked 2,542 hours and had the remainder of its warranty. The tractor had been dealer maintained.

The oldest Fastrac on offer and something of a classic was this 2002 3185 Smoothshift with 19,002 hours. It had Trelleborg 540/65 R30 fronts. £20,500 proved to be the winning bid.

£13,200 was the end result for this 2011 Rolland 6332 Rollspeed trailer on commercial axles with 560 tyres; it too had silage sides. Its 2015 counterpart sold for £15,500.

The 2008 Volvo L110F loading shovel had clocked 9,773 hours and was booted on 750/65 R26 agri tyres. It sold for a reasonable £36,500.

With 6,710 hours, this 2019 JCB Fastrac 4220 had also been supplied by Peacock and Binnington, was dealer maintained and was covered by a UK warranty for 8,000 hours. This example sold for £55,000.

There were a pair of 2010 Fastrac 3200s. The one shown had a front linkage, Firestone fronts, and it was hard to believe it had clocked a massive 23,106 hours. Yet it still made £18,000. The other plus spec tractor with no front links and on Vredestein front rubber had a more reasonable 10,767 hours and sold for £26k.

£38,000 was the end result for this 2006 3230 with plus pack and 8,194 hours. A 3220 of the same vintage with 6,947 hours went for £35k.

This 15,947 hours 2009 3200 sold for £18,000...

...while this 2009 Fastrac 3230 with 8,632 hours climbed to £26,000.

With 6,000hrs, this 2011 7490 DynaVT found a new owner at £34,000. It was on 650 rear, 540 front tyres and was auto steer ready.

The 2014 8737 DynaVT was well specced with 5,749 hours. It was on 600/70 R30 front and 800/70 R38 rears. The hammer fell at £50k.

An older 2007 3200, with 16,141 hours and, like the other Fastracs, really well maintained, achieved £19,000. A 2006 model with 15,208 hours was in more demand and sold for £26,000, while a 12,820 hour, 2008 tractor with front links and pto ended up commanding £25,000.

One of the big ticket items on the day was this 2019 Samson PGII28 tri-axle slurry tanker complete with telescopic loading arm, 14,000l/min pump, front and rear steering for the 800/60 R34 tyres with front axle lift and a 36m dribble bar. The dribble bar had self-levelling sensors and could be used at 24, 30, 32 and 36m. Someone stumped up £317,000 for it.

First of the self-propelleds to be sold was this 2013 Challenger TerraGator TG845 with a Sisu engine that had clocked 5,347 hours. Tank capacity was 18m^3 with a 9,000l/min Börger pump and an 8in loading arm. A Trimble RTK system looked after steering, while a Falcon VT did the rate control. It finished at £76,000.

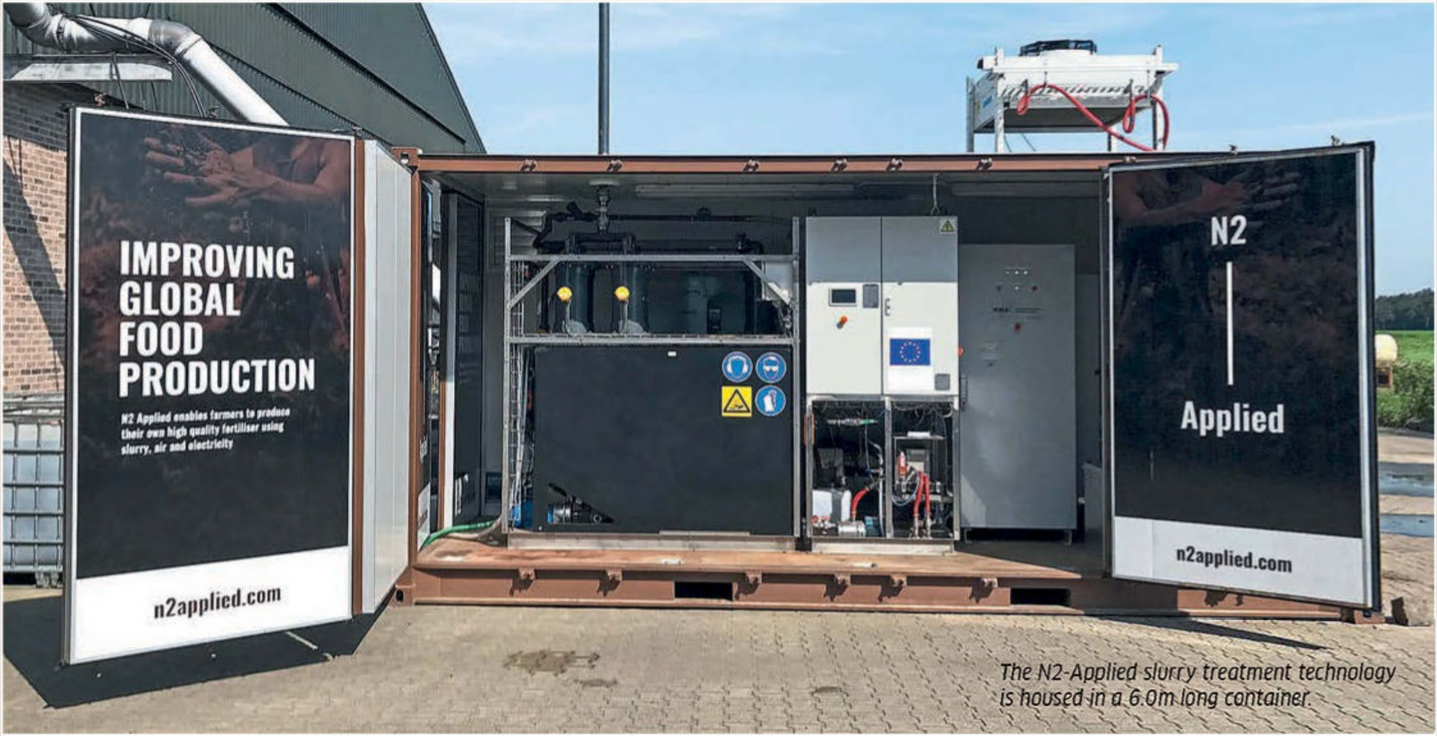
Dealer serviced and with a 6,000 hour warranty, this 2020 Massey Ferguson 8740S DynaVT with 2,249 hours sold for £133,000. Spec included two front, five rear spools and 600/70 R30 front and 800/70 R38 tyres.

£72k was paid for this 2018 8737 DynaVT which had clocked 4,660 hours. It was rolling on 650/60 R34 front and 710/75 R42 rears, had full auto-steer, climate control and four 250kg rear wheel weights.

N2-Applied slurry treatment:

Slurry in – N fertiliser out

It sounds almost too good to be true – slurry goes in and a readily available nitrogen fertiliser comes out. N2-Applied promises just that with its slurry treatment system. But there is a catch ...


IMPROVING GLOBAL FOOD PRODUCTION
N2 Applied enables farmers to produce their own high quality fertiliser using slurry, air and electricity
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The N2-Applied slurry treatment technology is housed in a 6.0m long container.

Norwegian start-up company N2-Applied has been researching new technology for slurry processing for more than 10 years. And the company name pretty much sums up what it is achieving – applying airborne nitrogen (N2) to slurry. Basic chemical theory states that while atmospheric nitrogen will often occur at up to 78%, it also reacts sluggishly. In other words, it takes enormous amounts of energy to get nitrogen in the air to react with other atoms. This is exactly what the Norwegian company has achieved with its plasma reactor, and it uses this system to further 'upgrade' existing slurry/digestate. The result is called N2-Applied in a futuristic way with NEO (nitrogen-enriched organic fertiliser): simply nitrogen-enriched liquid manure.

Modular principle

To do this, N2-Applied supplies a 6.0m long container in which the technology is already installed. All you have to do is plug it into a power socket.

The slurry product itself should be as free of impurities as possible (particle size less than 3mm and less than 8% dry matter). Therefore the firm recommends separating the slurry beforehand. The effluent is then pumped into the container, the technology inside consisting primarily of a large reaction tank,

KEEPING IT BRIEF

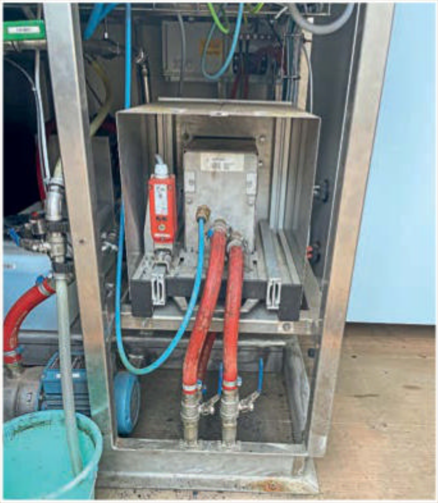
N2-Applied is a Norwegian company that has been researching slurry treatment since 2010.

It is possible to double the amount of nitrogen in the slurry. For this, the system requires about 10kWh of electricity per kg of ammonium-N.

The acidification of the slurry in the reactor reduces ammonia losses and increases the ammonium content.

The acidification of the slurry reduces ammonia emissions during spreading. It smells less like slurry.

The slurry has to be separated inside the plasma reactor before it is processed, because the system doesn't like impurities.



Looking decidedly inconspicuous, in this reactor the slurry is upgraded with nitrogen using both electricity and ambient air.

a plasma reactor and the necessary control and monitoring system.

10kWh of electricity = 1kg N

The principle of upgrading is ingenious, but it is as energy intensive as a Haber-Bosch process. In a semi-batch set-up, 100 litres of slurry is pumped in batches into the 2.0m^3 reaction tank. Inside the reactor (see 'How the plasma reactor works), nitrogen is added to the slurry with the help of the ambient air and electrical energy. As a result, the reaction lowers the pH value of the treated slurry. This means, the ammonia-ammonium ratio shifts towards ammonium – less gas is lost and more gas is available for the plants. As tempting as the N upgrading method of slurry sounds in times of expensive artificial fertiliser prices, physics can't be outwitted. For the process, the company has calculated that 10-15kWh of electricity is needed for each kilogram of generated nitrogen. So, for every cube of slurry, more than 40kWh is needed for the plasma reaction. The unit can currently treat 15-20m^3 depending on how much nitrogen is added. Utilising on-farm generated energy would be the preferred route, adding to the 'green' credentials while simultaneously reducing total methane and ammonia emissions.

NEO for potatoes

We were able to look at a plant already in operation at Jacob van den Borne's 600ha potato farm in the Netherlands. There is a lot of livestock in the area, so there is no issue with obtaining the slurry.

Untreated slurry is of limited use to Jacob, hence the interest in testing out the plasma reactor system. The evaluation process is still ongoing, but the method of enhancing the amount of available nitrogen does seem to have merit. When asked about the purchase costs for such a set-up there was a stoney silence, as the maker is looking to lease the units rather than sell them.

It will be very interesting to see how the technology develops, and there are plans to start manufacturing later this year.

Tobias Bensing

HOW THE PLASMA REACTOR WORKS

The plasma reactor uses electricity and ambient air to produce NOx gases (nitrogen oxides) from nitrogen (N) and oxygen (O) atoms; slurry or biogas digestate then absorb these gases. The nitrogen oxides combine with free ammonia (NH_3) and form ammonium nitrate (NH_4NO_3). At the end, the liquid still looks like slurry, but it is now a stable ammonium nitrate fertiliser – with a higher nitrogen content.

The nitrogen oxides also form the basis for nitric acid. The acid lowers the pH of the slurry to 5-6, depending on the initial substrate. The drop in pH has the same effect in the Syre-N process being offered by Vogelsang in the UK. The balance of ammonia and ammonium shifts towards ammonium (salt) with decreasing pH. This means that less ammonia gas is volatilised, reducing odours and increasing plant availability.

NIRS technology provides real-time readings of slurry nutrient levels with the potential to boost spreading accuracy to match the crop.

Monitoring slurry nutrients in real time:

Is NIRS the key to optimising slurry spreading?

Near infrared spectroscopy (NIRS) is a well-established system that will be familiar to those using the technology on a forage harvester to monitor crop quality 'on the fly'. NIRS can be further exploited to include determining the nutrient value of slurry. Could its adoption optimise slurry use and ensure field applications meet environmental regulations?

Field-specific guidelines and full documentation relating to slurry application is becoming part of modern farming. So too is the recognition that slurry is nutrient rich but also that its nutrient value can vary. To optimise its value the slurry needs to be spread to provide a uniform distribution of the nutrients available to crops. This is not easy as the nutrient content of slurry is typically taken from a number of samples which can only provide a broad outline of the material's overall values. In practice, nutrient levels can vary widely between tanker load, reducing the reliability of slurry as a fertiliser.

As slurry is not homogenous, even mixed and stirred in storage, an additional degree of difference in nutrient values are to be expected which can mean the even when it is applied accurately the rates are not necessarily linked to nutrient values.

Knowing what's in the tank

It is in applying slurry to exploit its nutrient value where NIRS near-infrared spectroscopy could offer significant ibenefits. A starting point is to use NIRS to analyse material as it enters the tanker. This will give a broad idea of the value of nutrients per tanker. To achieve this, a mobile NIRS analysis system

KEEPING IT BRIEF

NIRS can monitor slurry nutrient levels in real time.

Mobile systems can be used to establish nutrient levels per tank fill.

Can support automatic rate control and traceability.

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The Zunhammer mobile NIRS station measures slurry nutrient levels during filling.

is hooked up to the fill hose. This comprises of an NIRS sensor unit, flow meter and operator terminal. As slurry is sucked or pumped into the tank, the sensor unit determines the levels of N nitrogen, P phosphate and K potassium along with ammonia and dry matter as material enters the tanker. These values are recorded withing the control terminal to determine the overall nutrients within the tanker.

These broad values can now be used to establish the application rate of the slurry. As an example, if the system records nitrogen levels of 4.6kg N per m^3 of slurry, and the crop requires 60kg of nitrogen per hectare, the operator can key this into the terminal. This will then show the slurry application rate, in this case $13m^3$/ha.

A major advantage is that NIRS nutrient measuring is that the values are taken at the point of intake into the tanker. There is no time-consuming sampling and more nutrients within the slurry can also be recorded. In addition, the readings are immediately available and relate directly to the slurry at source.

Automatic application control

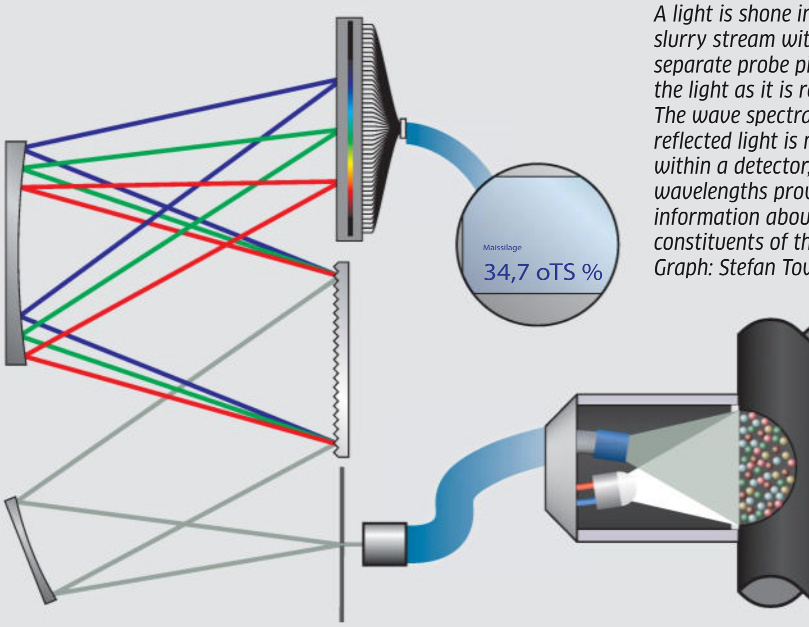
More advanced control takes applications to the next level, matching slurry flow to desired application rates. In this case, the NIRS sensor is installed on the tanker linked to a flow meter. This enables the application rate to be automatically varied on the go or for the operator to alter the flow rate to match specific field conditions. The application rate is varied by either altering the pump speed or adjusting a restrictor valve.

To patch in an NIR system, the slurry tanker will need electronic flow control or a tractor

A John Deere tractor and Fliegl slurry tanker combination used to demonstrate how the system can be used to vary the tractor's speed to vary application rates.

HOW IT WORKS

NIRS measurement uses near-infrared light to irradiate the slurry as it passes across a 'window' in the tankers intake and / or discharge system. Various constituents within the slurry absorb and reflect light at different rates and by measuring the reflections the system produces a 'fingerprint' with specific peaks determining levels of various constituents. A detector then evaluates the intensity of the reflections in comparison to a database of calibrated rates established by the system manufacturer. The nutrient levels of the slurry are estimated as opposed to being exact.



A light is shone into the slurry stream with a separate probe picking up the light as it is reflected. The wave spectra of the reflected light is measured within a detector, certain wavelengths providing information about the constituents of the slurry. Graph: Stefan Tovornik with TIM tractor implement management functionality. With TIM control, the tanker can be set to control the ground speed. Working with GPS mapping, the system can be set up to automatically document the nutrient levels applied and can also be set up to deliver variable-rate application.

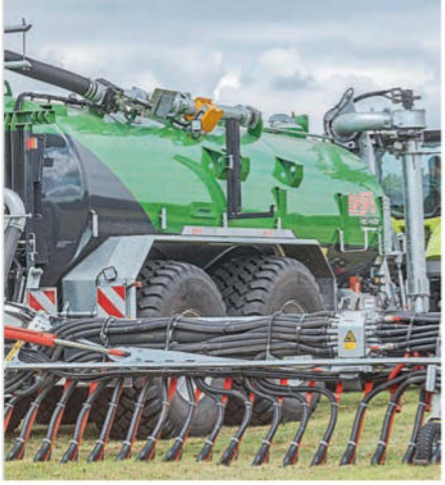
Accuracy with a question mark

It is of course necessary to ensure the recorded slurry nutrient measurements are accurate. The German Agricultural Society, DLG, tested the accuracy of various NIRS systems where it was found a given system's accuracy was related to the type of slurry and how it was calibrated to monitor individual nutrients to include nitrogen, ammonia, phosphorus and potassium, plus dry matter in cattle, pig and mixed slurries to include digestate. For a given NIRS system to get DLG approval, three out of five measurements must not show a deviation that exceeds 25% relative to a reference value and no deviation greater than 35%. Currently, measurements for nitrogen are typically the most accurate.

If this appears somewhat generous, it is worth noting that comparative laboratory slurry analysis showed fluctuations of around 15%. The act of sampling itself is a major source of error. In addition, lab sampling is not taken at the same time application, unlike NIRS systems. Taking all factors into consideration, the DLG estimates the accuracy of certified NIRS systems, in common slurry types and in typical field conditions, to be as 'accurate' as an equivalent to lab measurement. Slurries need to be subject to density and flow tests to improve testing accuracy and it should also be noted that current NIRS testing is not recognised as scientifically proven. This will mean NIRS-based documentation currently cannot be accepted as proof of correct slurry application.

Suppliers

NIRS slurry application measuring systems are currently offered by Zunhammer, John Deere, Kotte, m-u-t, Kaweco, Dinamica Generale, Topcon and BSA with others coming onto the market. As a guide to costs, fitting a system to a slurry tanker will cost in the region of €35,000, with operating and maintenance costs estimated at between €1,000 to €2,000 per annum. It is worth mentioning that the NIRS system needs to work with the electronics of the tractor and slurry tanker (or umbilical system). You cannot just assume systems will all 'talk' to each other.



Housed in yellow boxes, the NIRS sensor heads are installed in both the fill and discharge hoses.

2) The display can show nutrient levels and match these to the correct rate of application.

Summary

The potential for NIRS systems to measure the nutrient levels of slurry continuously and in real time, without manual sampling, is an interesting development. A key problem when applying slurry to arable crops is ensuring accurate application of key nutrients, fast and straightforward NIRS monitoring potentially making this possible. It will also ease sourcing slurries from different farms, with no need to have different sampling undertaken to ensure the consistent application of nutrient. If automatic data collection and documentation can be added into the mix, NIRS systems look set for a bright future.

Bernd Schlagge,
Lower Saxony Chamber of Agriculture

MODEL PROJECT NIR SENSORS FOR LIQUID SLURRY

In 2022, a trial with the snappy title 'Using NIR sensors for quantifying nutrient levels in liquid farm slurry' was started in Germany. Set to reveal its findings in June 2024, the project is funded by the Federal Ministry of Food and Agriculture in conjunction with other bodies to include the DLG and Kiel University. The aim is to use practical field trials to demonstrate the circumstances under which NIRS technology can lead to the more accurate application and exploitation of nutrients within slurries. Agronomic trials will monitor the effect of applying NIRS monitored slurry at varying rates across strips of arable crops and recording their subsequent yields. Initial findings ahead of the final report are due to be released later this year.

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AgLeader RightSpot

AgLeader is expanding its range of precision farming tech with its own PWM system to help reduce overlapping. Find out how it works in the June issue.

PRACTICAL TEST

Krone VariPack V190XC Plus

With the VariPack Plus, Krone has been offering variable-chamber balers with three belts to ensure excellent bale formation. Our test is with the range-topping V190XC.

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REPORT

Home Farm Nacton autonomous experience

The first commercially available robots have now been operating in the UK for over two years. We visit a Suffolk farm currently running two robots of very different design … to discover how they fit into the farming system and if they've been meeting the expectations of these experienced users.

REPORT

Smart Farmer app

Do you know how many hours are on each machine or when they're due for a service? And can you be sure to remember all of those little things that need fixing? Keeping on top of machinery maintenance is just one aspect of the Smart Famer app.

REPORT

Altec Ariane DR160S

Rather than blasting straw into cattle pens, Altec's Ariane travels on a rail above the livestock, resulting in a much gentler approach. Austrian farmer Martin Heusel runs through Ariane's benefits, having used the system for the past six years.

PRACTICAL TEST

Big Bale Transtacker

Complete with its CTF nudge-bar, Big Bale's latest Transtacker promises to minimise wheelings as well as gaining the ability to cross bales in the stack for extra stability. Last harvest we gave it a full field test.

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SPOT THE DIFFERENCE

We’ve made eight changes to this picture of a Case IH Magnum 380 CVX tractor cab. Simply locate your answers and mark them on the gridline picture at the bottom of the page – it’s just for fun.

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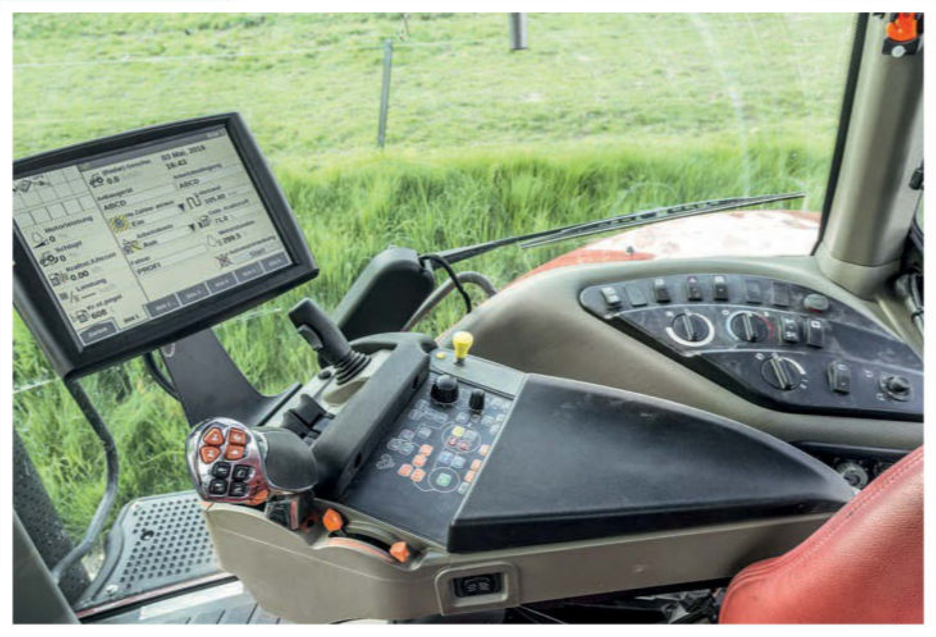

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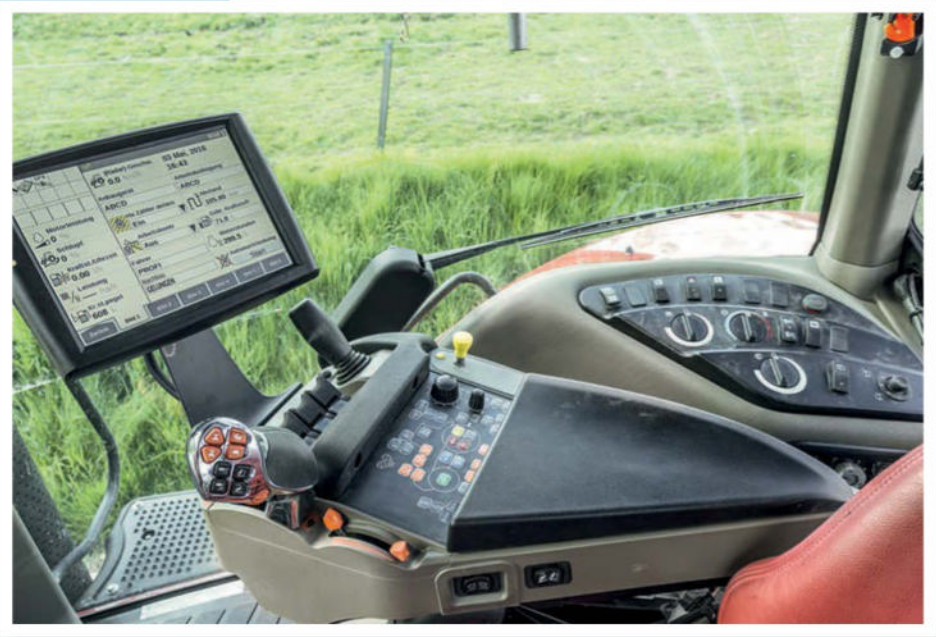
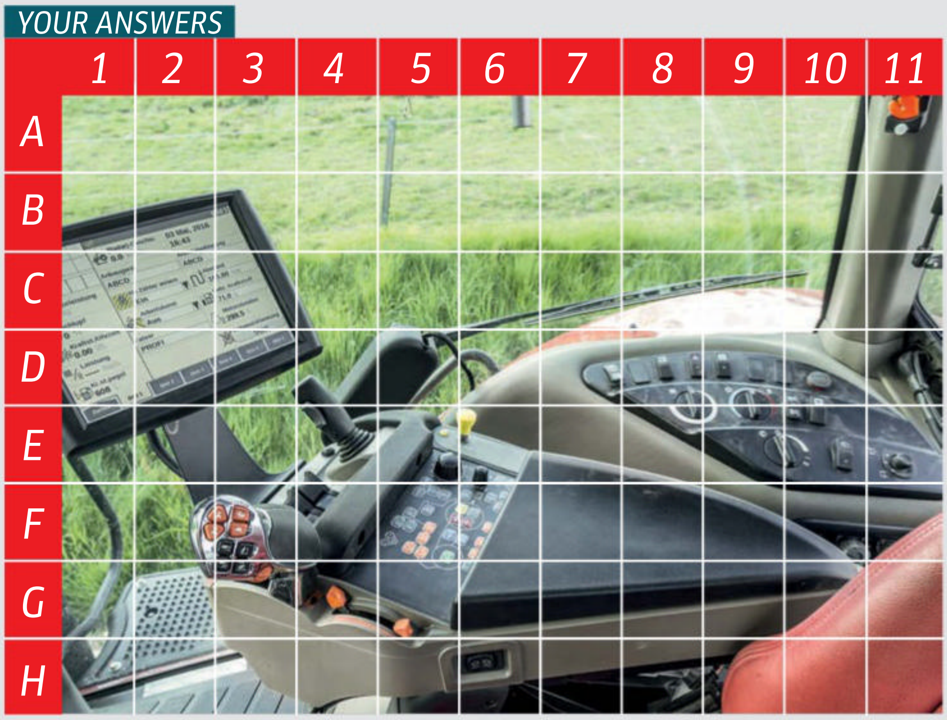


YOUR ANSWERS



THE DIFFERENCES IN LAST ISSUE'S PICTURES WERE IN THE FOLLOWING SQUARES:

A3, B9, D6, C/D9/10, E6, E7, C/E8/9, E8

UK contractor charges

This is the National Association of Agricultural Contractors (www.naac.co.uk) charge guide, based on info supplied by its members in the spring of 2022. The figures are **only a guide** and assume a red diesel price of £1/litre. Prices will vary according to UK region, size of job, type of equipment used etc

General operations

Operation	Cost /ha	Cost/acre
Ploughing – light land	£71.34	£28.89
Ploughing – heavy land	£79.13	£32.02
Ploughing – add for furrow press on plough	£6.69	£2.71
Power harrowing – seedbed preparation	£64.82	£26.23
Rotavating	£87.98	£35.61
Subsoiling	£76.99	£31.16
Mole draining – single leg	£95.57	£38.68
Stubble raking	£25.12	£10.17
Discing	£61.43	£24.86
Bed-tilling	£271.81	£110.00
Separating clod/stone	£285.00	£115.34
Potato planting	£197.68	£80.00
Spring tine cultivating	£46.01	£18.62
Rolling (flat for grassland)	£33.71	£13.64
Rolling (cambridge rolls)	£25.56	£10.35
Cereal drilling – combi-drilling	£78.39	£31.73
Cereal drilling – direct drilling	£71.37	£28.88
Cereal drilling – min-till	£56.28	£22.78
Rape drilling with subsoiler	£80.63	£32.63
Grass seed drilling with harrow	£47.86	£19.37
Grass seed (broadcast)	£32.33	£13.09
Grass seed (cross drilling, per pass)	£63.80	£25.82
Sugar beet/fodder beet drilling	£61.25	£24.80
Maize precision drilling	£56.73	£22.96
Maize drilling under plastic	£150.73	£61.00
Fertiliser – granular	£15.04	£6.09
Fertiliser – variable rate	£21.48	£8.70
Fertiliser – liquid	£14.48	£5.86
Spraying (more than 80ha)	£16.30	£6.60
Slug pelleting	£8.00	£3.24
Avadex application	£18.29	£7.40
ATV spraying (per hour)	£46.82/hr	£46.82/hr
Combining cereals	£110.71	£44.80
Extra for straw chopper	£22.96	£9.29
Combining OSR	£106.14	£42.95
Combining peas/beans	£109.10	£44.15
Swathing OSR	£58.00	£23.47
Grass mowing	£36.60	£14.81
Grass topping	£46.13	£18.67
Flail mowing margins	£48.44	£19.61
Tedding	£21.12	£8.55
Raking	£22.06	£8.93
Silage – grass (full service)	£189.70	£76.77
Maize harvesting incl. three carting and clamping	£198.95	£80.51
Silage – wholecrop (full service)	£203.44	£82.33
Forage wagon	£131.20/hr	£131.20/hr

Operation	Cost /ha	Cost/acre
Potato harvesting (no trailers)	£695.00	£281.26
Sugar beet – harvester only	£248.00	£100.00

Piece work

Slurry spreading – umbilical	£135.33/hr
Slurry spreading – umbilical extra pump	£64.00/hr
Lime spreading	£7.58/t
Baling (per bale) – conventional (straw/hay)	£0.88/bale
– 120cm x 70cm	£5.84/bale
– 120cm x 90cm	£6.79/bale
– 120cm round	£3.84/bale
– 150cm round	£4.69/bale
Bale-wrapping – 120cm round six-layer	£6.72/bale
– 120cm round four-layer	£5.51/bale
– 120cm round (without plastic)	£2.89/bale
– 120cm x 70cm six-layer	£8.63/bale
– 120cm x 70cm (without plastic)	£3.49/bale

Jobs charged per hour

FYM spread – tractor and rear disch. spreader	£67.05/hr
FYM spread – tractor and side disch. spreader	£56.00/hr
Weed wiping	£55.00/hr
Hedge cutting – flail	£47.84/hr
Hedge cutting – saw blade	£57.50/hr
Ditching 360° digger	£50.10/hr
Ditching 180° digger	£42.14/hr
Telehandler plus operator	£49.17/hr
Tractor and post knocker plus operator	£52.77/hr
Tractor (100-150hp) plus operator	£47.36/hr
Tractor (151-220hp) plus operator	£50.13/hr
Tractor (221-300hp) plus operator	£64.60/hr
Tractor (300hp+) plus operator	£79.89/hr
Additional charge for trailer	£11.14/hr
Snow ploughing	£67.26/hr
Labour only	£19.38/hr

Livestock operations

Sheep shearing – ewes	£1.65/hd
Sheep shearing – rams	£3.30/hd
Sheep shearing – crutching	£0.73/hd
Sheep dipping	£1.40/hd
Mobile feed milling/mixing	£22.00/t
Crimping	£14.07/t

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